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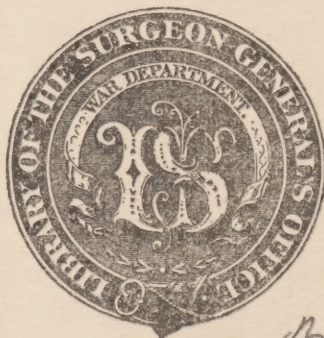
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ORTHOPEDICALLY HANDICAPPED CHILDREN

THE COMMITTEE FOR THE STUDY OF THE CARE AND
EDUCATION OF PHYSICALLY HANDICAPPED
CHILDREN IN THE PUBLIC SCHOOLS OF
THE CITY OF NEW YORK

Report of the Sub-Committee on
ORTHOPEDICALLY HANDICAPPED CHILDREN



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REPORTS
of
 THE COMMITTEE FOR THE STUDY OF THE
 CARE AND EDUCATION OF PHYSICALLY
 HANDICAPPED CHILDREN

GENERAL REPORT
 PHYSICALLY HANDICAPPED CHILDREN IN NEW YORK CITY
 OTHER REPORTS OF THE COMMITTEE

ACOUSTICALLY HANDICAPPED CHILDREN	EDMUND PRINCE FOWLER, SR., M.D. <i>Chairman</i>
CARDIAC CLASSES AND THE CARE OF CARDIAC CHILDREN	ARTHUR C. DEGRAFF, M.D. <i>Chairman</i>
CHILDREN WITH SPEECH DEFECTS	WALTER O. KLINGMAN, M.D. <i>Chairman</i>
CHILDREN WITH TUBERCULOSIS	I. OGDEN WOODRUFF, M.D. <i>Chairman</i>
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OPEN AIR CLASSES AND THE CARE OF BELOW PAR CHILDREN	I. OGDEN WOODRUFF, M.D. <i>Chairman</i>
ORTHOPEDICALLY HANDICAPPED CHILDREN	BENJAMIN P. FARRELL, M.D. <i>Chairman</i>
PSYCHOLOGICAL CONSIDERATIONS IN THE EDUCATION OF THE HANDICAPPED	IRA S. WILE, M.D. <i>Chairman</i>
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Preface

This statement of findings and conclusions of the committee studying the problems of children with orthopedic defects is one section of the report of the Committee for the Study of the Care and Education of Physically Handicapped Children in the Public Schools of the City of New York. This Committee was appointed by the Board of Education in 1936. All of its inquiries, which extended over a period of more than three years, have been made by sub-committees. No appropriation was given the Committee for the employment of technical and clerical personnel. The studies were possible only because of the voluntary assistance of physicians, educators and other specialists who have given much time and consideration to the problems presented by handicapped children, the provisions now made for them and the ways in which the existing program can be improved. Clerical and statistical help was provided by the Works Projects Administration and numerous philanthropic organizations.

In addition to the persons listed in this report the Committee is indebted to the Superintendent of Schools, Dr. Harold G. Campbell, to the teachers and school officials and others who have helped in the survey, and to Dr. Saul B. Sells, Director of Educational Research of the Works Projects Administration. The Director acknowledges his personal indebtedness to Dr. Lyman C. Duryea and to Dr. Robert T. Rock, Jr. Finally he is indebted to the Public Health Relations Committee of the New York Academy of Medicine which has critically reviewed this and the other reports of the Committee.

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CHANGING ATTITUDES TOWARD CRIPPLED CHILDREN

EARLY HISTORY OF CRIPPLES *

From earliest times the lot of the cripple has been a hard one. Among primitive peoples the cripple was often abandoned to perish of neglect. Destruction of deformed children existed among the Carib tribes of the Antilles. The Aztecs sacrificed deformed persons in time of famine and need and at the death of kings and great men. Crippled infants were abandoned or killed by various tribes living on the islands of the Pacific and in Australia. In the kingdom of Assinie, on the Gold Coast, children with six fingers on either or both hands were buried alive. Among the Indo-Germanic peoples, exposure of deformed infants to the elements was a custom of frequent occurrence. In the early law of Northern Germany the right of the populace to kill monsters and deformed persons is often mentioned. In early Persia all deformities were regarded as the work of the Evil One.

Among the Pima Indians, a North American tribe, deformed infants, with the consent of the parents, were taken by the midwife, who watched them until they died of exposure and want of nourishment. In this connection the Bureau of American Ethnology reports the Kioua, another North American tribe, are believed to have killed defective infants at birth, and instances of abandonment of the helpless aged in the same tribe are recorded.

Early Present Civilization

With the dawn of the present civilization the condition of the crippled did not improve. Oriental peoples turned forth their cripples to wander in the wilderness. The inhabitants of Ancient India cast them into the Ganges; the Spartans hurled them from a precipice into an abyss. The Jews in the earliest times banished their cripples. The general attitude was to regard physical deformity as a blight sent by God or as a punishment for sin.

* Douglas C. McMurtie, Johns Hopkins Hospital Bulletin, No. 276, Feb., 1914, p. 57, abstract.

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In the early Roman state the right to destroy a deformed child was granted to parents, provided the child was shown to five neighbors and their assent secured. In many instances they were cast into the street or drowned in the lake into which emptied the sewers of the Eternal City. They were exposed in deserts, in the woods on the banks of the Tiber, in the vegetable market, at a certain pillar in the eleventh district of the city, and, ironically enough, in the very vicinity of the Temple of Mercy. Some few of these unhappy children did not die of exposure or hunger and escaped being torn to pieces by dogs or being eaten by swine. But though their lives were saved, their existence became a wretched and miserable one. They became the slaves of the person who took them up and scored them, and they were intentionally crippled to a greater extent when they grew older if their deformities were not conspicuous enough to render them successful in begging alms for their master's profit. Seneca relates how these unfortunates wandered about exhibiting their mutilated members, and how they were intentionally deformed by cutting off their arms, or by twisting their shoulders so that they became hunchbacked. If their daily alms were insufficient, they were brutally whipped.

Among the Romans the trade in slave dwarfs became so extensive and profitable that the merchants put children in artificial bandages. This method, instead of making them well-proportioned dwarfs, made them misshapen and miserable creatures. This gruesome torture and unnatural art of making dwarfs is also mentioned by Cardanus.

Christianity

The Christian attitude had some influence upon the lot of the cripple. One quotation is illustrative: "Also cripples and the sick who remained alive were left to themselves in Iran as in Armenia and they led a wretched existence. In Armenia it was one of the greatest services of Christianity that it ameliorated the fate of these unfortunates." But the new influence was not profound and it did not even permeate the Church in its later development. During the Middle Ages, those with physical deformities were the subjects of contempt and ridicule.

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Middle Ages

With the opening of the Middle Ages the chief occupation of the crippled came to be that of court fool or jester. These persons almost universally found a place in the retinues of princes, and often in the households of noblemen.

The impressing of cripples into service as court fools as an institution was firmly entrenched for many years, despite many tendencies operating to improve the situation. Not until the time of the Enlightenment was the custom abolished. Even after this time the court fool was still in vogue at the Russian Court, Peter the Great having so many jesters of this type that it was necessary to divide them into classes. When the Spaniards under Fernando Cortez accomplished the conquest of Mexico, court fools and deformed human creatures of all kinds were found at the Court of Montezuma. The victims of human deformity were regarded with ridicule and contempt. In the existence of such an attitude on the part of the general public any sympathetic or merciful consideration can hardly be conceived.

During the latter part of the Middle Ages cripples came to be regarded superstitiously, this attitude being responsible for a continued miserable existence for those deviating to any degree from normal. Ignorant people and scholars alike were influenced by such prejudice, and cripples and deformed people were regarded as devilish monsters. Others regarded the deformed as victims of the wrath of God, and put them to death. Often, on the birth of a cripple or a child with superfluous members, the attack of a hostile army was feared. There is a similar legend of Babylonian origin.

At the birth of an undesirable child it was believed that some diabolical mother had stolen away the right child and substituted her own offspring instead. The child was thus known as a changeling. Cripples, rachitics and cretins were all regarded as changelings. The idea prevailed that if such children were maltreated sufficiently, their mothers would come again to get them and leave the rightful children in their stead.

Another phase of superstition affected the cripple—the belief that offspring could be harmed by “casting the evil eye” upon the pregnant mother. Parents were inclined to bring the deformity of their

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child into causal relation to a terrifying prenatal experience on the part of the mother.

Eighteenth Century

The first glimmer of hope for the betterment of conditions for the cripple began to appear in the eighteenth century though the progress in this direction was slow. The first measures did not in a strict sense mark the beginnings of care for cripples, but they operated to the ultimate advantages of those who, by reason of their infirmity, were cast upon the pity of their fellow-men. The activating motive in many cases, however, was utilitarian in character. One object was that all cripples might be confined so that they should not annoy the community by their deformed appearance. Some of the many monasteries which had not been utilized since the time of the Reformation in Germany, were thrown open and converted into orphan asylums, mad-houses, or penitentiaries. In the establishment of some institutions, the cripple was frequently considered. Such provision for them, however, gave asylum only and did nothing in a constructive way to better their condition.

The rise of the science of orthopedics was responsible for the ensuing improvement. It is true that one of the earliest Hippocratic treatises was orthopedic in character, but the attention which had been given to human deformity by the medical profession had up to the time of which we are speaking, been inconsequential.

An advance was made in 1780 when J. A. Venel, who was versed in both mechanics and medicine, founded an institution for the deformed, at Orber, Switzerland. Several other surgeons also did valuable work. The most complete books on the subject were by Jorg. The theories of the various orthopedists were put into practice in a large number of institutions founded in the first decades of the nineteenth century; as, for example, those located at Paris, London, Leipzig, Berlin, and Vienna.

Nineteenth Century

The first institution for the deformed in Prussia was established in 1823 by Dr. J. G. Blomer. This was designed for pay patients

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from among the upper classes, but indigent crippled children were also admitted. Between the years of 1823 and 1827 he treated no less than 1179 cases of deformity, of which he claimed to have cured 651.

A similar institute was founded in Stockholm, Sweden, in 1827. An institution was maintained in Hamburg during the years 1832-1837, and one in Vienna in 1838.

In the meantime, however, there had been founded in Munich in 1832 the first comprehensive institution for the care and education of cripples. An institution was organized by an eminent philanthropist, Johan Nepomuk, and the principles then exemplified have, in general, been followed by most of the modern institutions which have since been established. In Denmark, England and Italy, as well as in Germany and the United States, extensive systems of care have been built up, and in almost every civilized country of the world there is now made some provision for the welfare of the cripple.

The community has come to realize its responsibility toward the cripple and the early vicissitudes to which the deformed were subjected are in civilized countries a matter of history.

The Development of Classes for Crippled Children in New York City

Care of crippled children in the United States developed at a late date. It was in 1863, that a first attempt at orthopedic treatment came about with the establishment of the Hospital for Ruptured and Crippled in New York City. But while the process started late, it proceeded at a rapid rate.

In 1866, the New York Orthopedic Hospital was opened. In 1875, Minnesota established both a home and hospital for crippled children, the first of its kind in the world. Boston established the Boston Industrial School for Crippled and Deformed Children in 1893, and in 1898 the Children's Aid Society in New York City followed with special day schools. In 1900 the Guild for Crippled Children of the Poor of New York was organized and an Auxiliary of the Guild was formed and assigned to care for the great number of

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crippled children on the lower east side of Manhattan. The Guild began its work in two small rooms on Madison Street, with one teacher in charge of twelve children, and a one horse stage to transport them to and from their homes. Applications for admission soon swamped them and so taxed the facilities that appeals were made to the public for more support. The response permitted the leasing of a three story house at 29 Montgomery Street, and several teachers, a trained nurse and a regular visiting orthopedic physician were added to the staff. A kindergarten, classes in elementary school subjects and manual training, a dispensary and workrooms for hand sewing were instituted. In 1906 it was incorporated as the Crippled Children's Eastside Free School.

By 1905 other small private schools had also entered the field, supported by charitable agencies, and were serving a small number of crippled children. Dr. William E. Maxwell, the Superintendent of Schools, reported that year that the public schools with the necessary equipment and especially trained teachers could meet the exigencies of the situation. It was believed that there were between 3,000 to 5,000 crippled children in the city, but there were only seven small private charity schools for their education. In 1906, a committee of the Board of Education, after studying the work of the private schools, recommended that those classes become a part of the public school system of the City.

The result of the report of the Committee was that in 1906 New York City became one of the first cities in this country to provide special classes for crippled children in the public schools when the Board of Education established a class for crippled children in P. S. 104 Manhattan, and also took over the teaching work of two schools that had hitherto been privately maintained, the Crippled Children's East Side Free School and The Madison Avenue School for Crippled Children.

Classes for crippled children grew rapidly in number, and by 1909 there were 20 of them with a register of 374 pupils. A year later, there were 458 crippled children attending 25 classes in eight schools. The Eastside Free School for Crippled Children Association housed nine of these classes, and the Day Home and School for Crippled Children accommodated two classes and provided

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transportation for the pupils to and from their homes. The Association for the Aid of Crippled Children continued to transport the children of ten other classes.

In 1914 the children were segregated into three groups: 1. Those with tuberculous joint diseases; 2. Those with non-tuberculous joint diseases, or their results; and 3. Mentally defective cripples. In regard to the first category, many cases with tuberculous joints had also pulmonary tuberculosis. These children formed about one-third of all cripples in the public schools and were segregated aboard the ferryboat *Southfield* (P. S. 14 Annex, Manhattan), in P. S. 44 Annex, Queens, in the Ocean Beach Hospital, Napsont, Rockaway Beach, and also at P. S. 162 Brooklyn and P. S. 69 Manhattan. The typical equipment at P. S. 69, which was recommended for 11 similar classes, consisted of adjustable furniture and air cushions for comfort, sanitary iron couches with washable canvas stretchers and air pillows; new model folding chair planned by the Department of Physical Training for tuberculous hip cases, or for children who could not lie upon couches with comfort; blankets and sweaters for cold weather; and a room with open window ventilation, southern exposure and a temperature of 50-65° in winter.

In 1920, a rather full report was issued on the work done with crippled children in the public schools.* In that year, there were 78 classes with a register of 1,471, and to these classes the record indicates there were to be added four kindergarten classes, 12 classes for children with bone tuberculosis, one class for ungraded cripples and nine classes for crippled children confined to hospitals, each class being an annex to a public school. These latter nine classes were apportioned among the following institutions: Bellevue (1); Deformities and Joint Diseases (1); Blythedale Home (2); Kings County (2); House of St. Giles (1); Long Island College (1); and Montefiore Home (1). The regular course of study outlined by the Board of Superintendents for the eight grades in the elementary schools, was followed in all these special classes as far as conditions would permit, but there were limiting factors deter-

* 20th, 21st and 22nd Annual Reports of the Superintendent of Schools, 1918-1920. Reports on Special Classes, pp. 100-122.

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mining the amount of work that ultimately could be expected. These children were educationally handicapped by a shorter school day, frequent periods for rest, relaxation and treatment, varying and frequently large grade-spans in a single class, and the pupil's physical condition itself.

In 18 schools containing classes for crippled children, an Industrial Art Course was inaugurated to fit the children to earn a livelihood. The girls were taught millinery, the making of ornaments for hats and dresses, and the making of bead work and French flowers and cotillion and dinner favors. The boys learned full and half block lettering and spur lettering as a foundation for sign printing and architectural drawing. Other vocations were omitted because of expense and shortage of funds. In six of the 18 schools, girls received instruction in cooking.

A survey sponsored by the Board of Superintendents which was reported in 1920 revealed that some of the special classes enjoyed a maximum of physical, intellectual and industrial educational advantages. "Others have little that justifies us in calling them special classes." To equalize the advantages, it was recommended that there be:

1. Unified control of the classes to bring about a system for efficient referrals to proper outside agencies for special assistance; an adequate record system; and an adequate transportation system to convey the children to schools, clinics, and work.
2. Standardization of forms of organization and methods of teaching cripples.
3. Study of openings in industry as a basis for selection of trade training in different localities.

The Report of the Superintendent of Schools for 1920 disclosed that there were 2,049 crippled children now registered in 96 special classes. The reason for this increase was the 1916-17 poliomyelitis epidemic which had added to the long list of crippled children, and these children, it was claimed, as they reached school age, would need special education and transportation. In connection with the epidemic, expanded home teaching services were devel-

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oped to deal with a situation resulting from 750 severely crippled children.

In 1925 there was a total of 139 classes with a register of 2,894 children. In that same year, the Public Health Committee of the New York Academy of Medicine reported that there were about 18,000 crippled children in the city under 16. In 1925, physiotherapy was provided through philanthropic sources for two schools, P. S. 41 and 58 Manhattan. A survey that year of educational facilities for crippled children by the Educational Measurements Bureau of the State Department of Education showed that New York was one of the nine cities of the State providing educational advantages for those children; that it was one of the five cities providing the same opportunities for those children as were given normal children; and that it was one of two cities placing these special classes in the public schools.

The registration in special classes for the orthopedically handicapped had varied from year to year since 1925. When this study was begun in 1938 there was reported to be 2,430 children in them. There are no classes for crippled children in the secondary schools.

The provision for medical care and follow-up services for crippled children by means of referral of the children by the school to the proper agency is the procedure in many foreign countries. Indigent children receive such care at public cost. While children are in hospitals, their education is continued to avoid interruption in normal mental development. Upon discharge from the hospital they are placed in special classes if their condition warrants it. The advisability of avoiding segregating them is recognized and it is considered that a crippled child ought to have, if possible, the same conditions during school as the normal child. The more advanced programs are to be found in the Scandinavian countries and in Denmark. In Denmark, segregation is practiced only when the infirmity is such that normal schooling can not be carried out and, in doubtful cases, the child is tried in a regular school before being segregated. The necessity of obtaining proper orthopedic treatment and proper schooling is stressed. The Scandinavian concept is to lessen the prevalence of reduced work capacity. Vocational training is provided as an extension of general education.

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The Committee has written to more than 100 cities throughout the United States to determine the provisions being made in the school systems for crippled children. In a few cities special schools are maintained but in the majority of cities the children are adjusted in the regular schools either in regular classes or in special classes.

In connection with the present study of the New York City Program a number of other cities where special provisions are being made have been visited to observe the methods employed in caring for orthopedically handicapped children. Most of the programs are of comparatively recent origin and no well-defined policy was apparent. Good results were reported by cities with special schools for handicapped children and also from cities which do not have such schools but make adjustments for the children in regular schools.

CRIPPLING CONDITIONS AND THE EXTENT TO WHICH EDUCATIONAL PROVISIONS ARE NECESSARY

There are a large number of diseases and injuries which cause crippling in children. The extent of crippling resulting from any specific cause varies over a wide range from slight crippling resulting in no actual handicap to the most severe forms of paralysis, such as those resulting from poliomyelitis, and from cerebral palsy with its often associated multiplicity of handicaps, including handicaps in the facultative avenues.

In establishing an adjusted educational program for physically handicapped children it is necessary to modify the school program in relation to the varying degrees of individual handicaps. The basis for program modification is physical disability. With the exception of those who have sensory handicaps, such as sight, hearing or speech, or certain motor defects, which are associated with cerebral palsy, the teaching techniques that are used with normal children are equally effective for crippled children.

It is not the degree of the physical impairment but the degree of handicap that is important; the residual abilities of the handicapped child should be stressed rather than the disabilities. *Principles of admission to special orthopedic classes should be rigid and only children in need of protective care or special educational methods which cannot be applied in regular classes should be admitted to them.*

The most common causes of crippling are:

Poliomyelitis

Anterior poliomyelitis is caused by a small organism called a filterable virus, which is said to enter the body through the nose and throat, to multiply there and to pass to the central nervous system. The paralysis or loss of nerve and muscle function is a direct result of the damage to the nerve cells of the spinal cord. Fortunately, paralysis does not develop in all cases. During a period of two to three years following the disease in a child some of the paralyzed muscles may regain a portion of their power or their full power in many fortunate instances. Fortunately, loss of function is

more frequently partial than complete, although complete paralysis does occur.

The possibility of recovery, from the acute stage of the illness is based on the location and extent of the paralysis and the occurrence of complications, especially pneumonia. The fatality* rate varies from 15 to 30 and appears to be lowest in epidemics. The chance of ultimate recovery of the use of the body musculature is difficult to prophesy as the amount of recovery is dependent upon the amount of damage to the spinal cord and upon the treatment. This consists of (1) Early rest, (2) Prevention of deformity and of muscle stretching, (3) Muscle training and massage intelligently administered or, (4) Mechanical and operative treatment as necessary in individual cases.

Improvement usually occurs over a period of two or three years and, therefore this period is usually considered as a convalescent period. During convalescence the child should be under the constant and continuous care of the orthopedic surgeon. Cooperation on the part of the patient, parent and teacher is essential to see that the child is receiving this constant and continuous attention. This is most important if serious deformities which are apt to occur during this long period of convalescence are to be avoided. The school has a definite responsibility to make it possible for the child to take time from school if necessary for treatment.

Following the convalescent period is the period of residual paralysis—a time when no further improvement in the paralyzed muscles may be expected. It is at this time that operative intervention is usually instituted to overcome certain types of deformities or to restore the muscle balance, i.e., to equalize muscle pull or to stabilize joints which have become loose or relaxed due to loss of muscular support.

In New York City a large proportion of the crippled children are crippled from poliomyelitis. Not all of those children, fortunately, are severely handicapped, although the majority of severely crippled children are crippled as a result of this disease. The most frequent locations of paralysis are well known. Paralysis of one leg is most common; next in frequency is paralysis of two

* Deaths per 100 cases.

CRIPPLING CONDITIONS AND NECESSITY FOR EDUCATIONAL PROVISIONS

legs, while paralysis of the arms is relatively infrequent. About 19 per cent of these children are crippled in both feet or both legs, and an additional 2 per cent have a severe crippling in the back. About 1 per cent are crippled in both hands or both arms; about 8 per cent in the entire body, and about 2 per cent in the spine and one or two extremities. About 65 per cent of the children with crippling defects from poliomyelitis can be educated in regular classes without obvious special consideration.

Congenital and Prenatal Conditions (or Causes)

The second greatest cause of crippling in children under 21 years of age is the group of conditions due to congenital and prenatal conditions (which exist prior to birth) and injuries of the nervous system which occur during birth. They all exist at the time of birth. Crippling conditions due to prenatal conditions and to injuries of the nervous system at birth are quite numerous.

In order of frequency of occurrence the crippling conditions resulting from congenital and prenatal conditions are as follows:

1. Club foot.
2. Dislocation.
3. Mixed causes (not in order of frequency of occurrence).
 - Achondroplasia.
 - Amyotonia, congenita.
 - Hemorrhagic hemophilia (into joint).
 - Congenital atrophy.
 - Hypertonia.
 - Hypotonia.
 - Osteogenesis imperfecta.
 - Fragilitas Ossium.
 - Osteoporosis.
 - Sprengel's shoulder.
4. Torticollis.
5. Fusion defect (spina bifida) etc.

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6. Absence of a part.
7. Joint deformity.
8. Supernumerary part.
9. Hypertrophy of a part.

Club Foot

Children with club feet which have been satisfactorily treated, as most are, require no special facilities in an educational system. Some children whose club feet have not been corrected can not readily take part in a regular school curriculum.

Dislocations

Dislocation of the hip is the most common and most important type of dislocation occurring as a result of prenatal influences and there is quite probably an hereditary influence in the occurrence of this condition. With modern methods of treatment which should be begun early in life, about 80 per cent of these cases should result in complete cures. The condition is important because, while only less than three per cent of all orthopedic disorders are caused by it, nevertheless the symptoms increase with age, and disability increases.

Most cases of dislocations of the hip are corrected in early childhood. The uncorrected cases, although they walk with a waddling type of gait require no special school arrangements as they have the ability to get about with relative freedom.

Congenital Torticollis (*Wry Neck*)

This is a deformity where the head is bent toward one side and the chin is tilted up toward the other. It is caused by a contraction of the neck muscles of the side toward which the head is drawn. There are secondary effects on the eyes and ears and spine, and the efficiency of these become decreased.

Early treatment results in the cure of deformity. Although children with persistent wry neck present a distortion of normal body posture and face there is no difficulty in locomotion or

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activity. The secondary effects upon the eyes and the ears should be subjected to periodic examination. No special school procedures are required further than follow up to see that proper medical attention is received.

Other Conditions in this Classification

Such conditions as Spina bifida oculata (Fusion defect), Achondroplasia, Amyetonia congenita, Hemorrhagic hemophilia, Congenital atrophy, Madelung's Disease, Sprengel's Disease are of relatively infrequent occurrence. Usually no special educational procedures are required for children afflicted with them. The severe spina bifida cases are paralyzed from the hips down.

Injuries to the Nervous System During Birth

The most common birth injuries are obstetrical brachial paralysis, often called Erb's Palsy, and Spastic Paralysis, also called cerebral spastic infantile paralysis, cerebral palsy, cerebral diplogic infantile paralysis and Little's Disease.

Erb's Palsy (Obstetrical Paralysis)

This is paralysis of one or of both upper extremities and is occasionally apparent following the birth of a child. This is especially common following difficult labor. The paralysis is due to injury of some of the nerves which supply the whole upper extremity. The involvement depends upon the severity of damage to the nerves.

The arm is seen to hang limply at the side and turned inward toward the body. Where the upper arm alone is involved, the chances for recovery are better than when the whole arm or lower arm is involved. In the treatment, measures to prevent deformity and to aid return of muscle power are instituted. When the child is old enough, he should be taught to play with toys and games in order to encourage the use of the muscles and he should not be segregated in special classes, but rather should learn to compete with other children of his own age.

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Other Crippling Conditions

Osteomyelitis is an infection of the bone or of the bone and marrow—the material that fills the cavities of the bones. It may be acute or chronic in its nature. In the acute condition, bone destruction is occurring. In the chronic condition the destructive process is less active. While other organisms may cause the condition, the usual organism causing the infection is a variety of the staphylococcus.

Osteomyelitis may follow a slight blow over the bone, and although the skin may not be broken, and thus no bacteria can pass through, nevertheless, bacteria do reach the site of the blow. It occurs most frequently before age ten. The leg bones are more often affected than other bones, and especially the large bone of the lower leg.

Osteomyelitis is a cause of severe crippling in many cases where the condition exists. However, the total number of children crippled from this condition is about 15% of the number crippled from poliomyelitis and the total number of children severely crippled from the condition is relatively small. When the condition severely limits activity it may be necessary for a child to be placed in a special orthopedic class, at least temporarily.

Tuberculosis of the bones and joints was formerly a very common disease. Although at present it is by no means uncommon, the prevalence has markedly decreased in recent years.

Tuberculosis of the Bones is almost invariably a local manifestation of a general infection with tuberculosis. The development of the disease is favored by other general or local diseases, such as debilitating diseases like influenza and by the diseases of childhood. The skull bones, the short bones of the hands and feet, the spinal vertebrae, the large bone of the lower arm, the upper leg bone, and the upper arm bone, are the most common sites of infection.

With adequate treatment, the eventual chances of recovery are good. The most serious foci of infection are the bones of the spinal column and hip, especially in the very young. Treatment should be provided preferably in a sanatorium.

Tuberculosis of the Joints is usually secondary to a tuberculosis infection in some other area of the body. It occurs chiefly in chil-

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dren, most of whom are under age 14. An injury near a joint may be a precipitating factor. Usually but one joint in an individual is affected. Deformity occurs early in the disease and results from the muscle contraction and resultant muscle shortening. The limb may become shortened due to a slowing up of its growth in length or to actual bone destruction. There is not serious danger to life if efficient treatment is provided.

Tuberculosis of the Hip Joint occurs less frequently than tuberculosis of the spine, and it usually occurs before the age of ten. It begins near the cartilage of the growing part of the head of the femur or thigh bone and spreads toward the joint and eventually attacks the bones forming the joint. If the condition is left untreated, much deformity and fixation of the joint results. The incidence of crippling due to tuberculosis of bones and joints is decreasing. There are less than 500 children in New York known to have crippling conditions resulting from tuberculosis infection. Most children with tuberculosis of the bones and joints require special educational consideration for prolonged periods. Practicality and common sense dictate that any child following a prolonged illness or an operation might require special consideration for a period following hospitalization. This can be obtained by the facilities afforded by a lightened or modified school program. The same dictates apply following any operative procedure, fracture, injury or hospitalization for acute infection.

Children with the following conditions usually require no special educational facilities after the treatment is completed:

Osteochondrosis is a derangement of the normal process of bone growth at the epiphysis and is non-inflammatory in nature. All growing joints in the bones of the body are subject to the condition. The cause is unknown. The onset is gradual and the symptoms resemble those of an early joint tuberculosis.

Osteochondrosis Deformans Coxa Juvenilis, also called *Coxa Plana*, *Quiet Hip Disease*, *Flat Head*, *Perthe's Disease*, *Legg-Calve-Perthe's Disease*, and *Pseudo Coxalgia*.

It is a name applied to a deformity of the head of the thigh bone in the hip joint, caused by a disturbance in growth of the cartilage of the epiphysis which undergoes atrophy. Its occurrence

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is usually in children of ages five to ten and is more common in boys. An early sign is a limp which may be associated with pain. Later, muscular spasm develops and there occurs a limitation of movement of the hip joint.

Osgood Schlatter's Disease is a similar condition to the above, affecting the epiphysis at the upper end of the tibia or large bone of the lower leg. There is some pain and tenderness and aching in front of the knees.

Coxa Vara is a depression or lowering of the so-called neck of the femur. The neck of the femur is that part of the thigh bone which extends at an obtuse angle from the thigh bone toward the pelvis where its head enters into a formation of the hip joint. This condition is sometimes congenital. Other cases develop as a result of other diseases, as disturbance of the epiphysis previously mentioned.

Slipped Upper Femoral Epiphysis is a condition in which the upper femoral epiphysis has slipped and usually results in severe deformity if uncorrected. It usually occurs in overweight adolescent children.

Scoliosis is an abnormal curvature of the spine, a lateral curvature, resulting from a permanent deviation from the mid-line of parts of the vertebral column. There is a resultant change in the relation of the position of the ribs and pelvis and changes in the muscles and ligaments, and a disturbance in the normal action of muscles, the function of which is to maintain the normal bodily posture. In severe cases, there may be compression of the lungs and displacement of the heart and abdominal organs. A mild type of scoliosis is common in school children and may result from assuming poor posture continuously, which in turn may be caused by weak musculature. It can be overcome voluntarily. In the more severe type there is definite deformity which cannot be overcome voluntarily, as permanent changes in the relation of the vertebra and ribs and muscles and tendons have taken place. Changes take place in the structure of the vertebrae, some of which become compressed to a wedge shape and others above and below become rotated. Usually the child with scoliosis suffers little inconvenience and is able to carry on his usual physical activities. In severe

cases there may be associated pains due to pressure of the ribs on the crest of the pelvis.

In the mild cases where the usual cause is faulty posture, the cause should be eliminated and corrective exercises instituted. In the more severe cases where structural changes have taken place, the deformity is apt to be serious and treatment is directed toward overcoming the distortion and deformity of the spinal column. In serious pulmonary diseases with empyema, the possibility of the later occurrence of scoliosis as a result of the pull of fibrous adhesions should be considered, and such children should be re-examined frequently as a measure toward preventing the onset of scoliosis from this cause.

Assignment of Children to Special Classes

As previously indicated, it cannot be categorically stated that all children with one or another of the above conditions require segregation in special classes. Selecting children for special consideration must be upon the basis of the individual child's requirement. Certain children may require home instruction but this severe and essentially non-social treatment should only be provided to those children incapable of adequate locomotion. The so-called crippled class should be restricted to those children with freedom of activity rather than those properly excluded from school. Only those unable to conduct their daily lives with safety to themselves or others should be admitted to special classes. The selection of children for these classes can only be soundly made on the basis of competent orthopedic individual consideration. Such consideration includes a study of the part of the body involved and the extent of physical ability of each child.

Children with less severe orthopedic conditions not requiring segregation in special classes but who can benefit from the physiotherapy provisions which this Committee is recommending, should be assigned to regular classes in schools in which orthopedic units are established. They may then be scheduled for the recommended physiotherapy treatments, the same as are the children in the special classes.

CRIPPLING CONDITIONS AND NECESSITY FOR EDUCATIONAL PROVISIONS

The Estimated Extent of the Need for Special Educational Provisions

A study was made in 1940 for this Committee by the Crippled Children's Division of the Department of Health. Based upon a random sample of 1,277 children selected from its register of 16,731 crippled children, estimates were made of the number of orthopedically handicapped children in New York City who could possibly utilize existing school facilities so far as their ability to use such facilities may be affected by their physical disability.

For educational purposes, crippled children may be arbitrarily classified into one of the three groups:

	<i>Age in Years</i>
1. Pre School	0—5
2. Primary School	6—13
3. Secondary high and vocational school	14—20

For purposes of study, crippled children within each of the three age groups were classified into one of the three general groups:

- I. Those who could possibly attend schools with normal building facilities without material difficulty.
- II. Those who could possibly attend schools if the buildings were equipped with ramps and elevator service.
- III. Those who could possibly NOT attend schools, under conditions I and II above, but who would require special educational consideration.

The findings for each of the three groups, by age, are presented in Table I.

TABLE I

<i>Age Group</i>	<i>Estimated Number of crippled children*</i>	<i>Group I</i>	<i>Group II</i>	<i>Group III</i>
0—5	2,200	1,600—1,900	0—70	300—600
6—13	7,900	5,300—5,900	250—500	1,600—2,100
14—20	9,300	6,200—7,000	90—350	2,000—2,800
Total: 19,400.				

* From the "Crippled Children in New York City, 1940," by the Commission for Study of Crippled Children.

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It is important individually to determine the actual degree of handicap present in each of the children. To do this, it is necessary to consider each child individually and not categorically for purposes of selection of those who require special educational provisions. To select children on any other basis is to invite the danger of superimposing upon an already existing physical handicap, an additional psychological handicap.

Some of the crippled children can be assigned to regular classes and pursue the presented program for normal children; another large group of these children can be satisfactorily adjusted in regular classes by making some allowances for their physical incapacities. A relatively small number of crippled children must be segregated in special classes for varying lengths of time.

Physical Status

An analysis of the present age of crippled children shows that while a regular yearly increment of children who are crippled from all causes is added to the crippled child population, poliomyelitis epidemic years affect particular age groups severely. The ages of the children at the time of onset of crippling were studied, and it was found that about 45 to 50 per cent of all recovered cases of poliomyelitis occurring from 1918 to 1939 have a residual paralysis of varying type and severity.

About 70 percent of children with crippling resulting from poliomyelitis are disabled before age five and 90 per cent before age ten. This emphasizes that major consideration should be placed upon the detection of the disease and the treatment of children during the pre-school and early school period. Nearly all children crippled from all other causes do not come under treatment as promptly after onset as do children with poliomyelitis.

There are more crippled boys than girls, in the ratio of 52 boys to 48 girls.

About 75 per cent of all cases of crippling fall into four diagnostic classifications in the order of occurrence and possibly in order of importance as causes of crippling, namely: poliomyelitis, prenatal influences, birth injury and infection.

The parts of the body most frequently affected by a crippling con-

dition are the feet and legs. This is true of poliomyelitis as well as of crippling due to other causes. The extent to which crippled children are handicapped in competing with normal individuals varies greatly. Many of those crippled from conditions other than poliomyelitis will probably recover or adjust themselves to a considerable degree within a period of five years.

About 60 per cent of those affected in the feet and legs do not require appliances to enable them to get about. 30 per cent require appliances and between five and ten per cent are confined to wheel chair or bed. Of these children with diminished capacity of arms or hands, about 80 per cent have partial loss of use of one or both upper extremities and about 20 per cent have complete loss of one or both arms.

THE EXTENT, PROCEDURES AND FINDINGS OF THE STUDY

In the Spring of 1938, the Division of Physically Handicapped Children was requested to compile information concerning its program for orthopedically handicapped children so that the members of the Committee could have a preliminary orientation in the problems which the schools were trying to meet. This resulted in a booklet of 54 pages which was given to the members of the Committee before the study was planned. Spot maps were also prepared showing the location of each of the classes for crippled children and the residences of the children attending them. The following outline shows the scope of the work undertaken:

- a. Statistical analysis of age-grade progress.
- b. Statistical analysis of age and grade spans in the classes.
- c. Licensing requirements for teachers of special classes and the qualifications of the teachers.
- d. A study of the records and administrative procedures of the Division of Physically Handicapped Children.
- e. A review of the findings of the Commission for the Study of Crippled Children and additional statistical analysis of its data.
- f. A study of proposals and recommendations made by principals and assistant superintendents which were submitted in questionnaires returned to the committee.
- g. A review of the findings and recommendations of an independent committee of special class teachers.
- h. Visits to the schools for the purpose of observing the work being done and discussions with teachers and administrative officers. These were made by orthopedic surgeons, physical therapists, physical educators, and specialists in the education of crippled children.
- i. Visits to other cities to observe their methods for meeting similar problems.
- j. Determination by means of questionnaires how school systems throughout the country are providing for crippled children.

THE EXTENT, PROCEDURES AND FINDINGS OF THE STUDY

- k. A study of the vocational training and vocational training facilities.
- l. A general consideration of the work being done for the cerebral palsied throughout the country and the provisions which should be made for these in the schools of New York City.
- m. Visits to the homes of children receiving special home instruction.

THE RECORDS AND ADMINISTRATIVE PROCEDURES OF THE DIVISION OF PHYSICALLY HANDICAPPED CHILDREN

It is the view of the Committee that the place of records in any system is subordinate to the purposes and needs of the system. In dealing with a system of the kind under consideration, which is responsible for the education of special groups of children involving a per capita expenditure that is distinctly higher than that for normal children, the record set-up should be somewhat more elaborate than for ordinary pupils. Individual records should be available for each child containing adequate descriptive data which will show the condition for which the child is placed in the special category and also the progress being made. Insofar as records can, they should contain information, which when properly collated, will show how needs are being met and how the policies of the administration are being carried out.

The Committee has judged the procedures and records largely from this point of view. While the procedures and record-keeping may be different for a centralized administration, as compared with one that is decentralized, certain basic information, kept reasonably up-to-date, would appear to be necessary for the proper conduct of a department handling special groups of children.

The Committee's study of this division is not as complete and as satisfactory as its members would have wished to make it. The official in charge of the Division failed utterly to cooperate with the Committee, and, in fact, actually obstructed its work. At first it was insisted that because of pressure of work it would be impossible to spare any time to interview a member of the committee. When the Committee member visited the Division it was stated

THE EXTENT, PROCEDURES AND FINDINGS OF THE STUDY

quite insistently that the proposed work of the Committee had already been done by another group, and a report made, and that, in any case, the office was too busy to permit any interference with its work at that time, and, furthermore, that the records were confidential in nature. During the summer of 1939 the Assistant Director in Charge was asked to return to the city and was informed of the needs of the Committee and that her presence in the City would not be required if the records of the office were available for review. After leaving, however, the member of the Committee reviewing the records was told that only certain ones could be seen and in fact, during part of the summer when the Committee wished to work, the person in charge of the office was not acquainted with the location of certain records to be consulted. Members of the staff of the Division were most courteous and tried to be helpful, but of course, could not furnish information except as authorized by their superior officer. The result was that the work of the Committee was hampered. Much of the time spent was wasted and the information available to the Committee is necessarily quite restricted. The information gathered may, however, be of some value in judging the adequacy of the records, their use in practice, and may serve as a basis for suggestions for improvements.

Examination of Reports of the Division

The Committee requested from the Acting Director of this Division copies of such reports, annual and other, which summarized the experience of the Division, and which would assist the Committee in seeing how the Division records were serviceable in measuring results and in guiding the Board of Education with respect to the adequacy of the provision for the children under the jurisdiction of the Division. No reports were submitted in answer to this request, but the Committee was referred to the Special Report on Education for Handicapped Children which constituted the annual report of the Associate Superintendent for the school year 1933-1934. Subsequently the annual reports of the Division for 1936-1937 and 1937-1938 were procured through another source.

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The chief interest in these reports was to see how the records were used to administer the program of the Division and in summarizing its experience. It was found, however, that the reports were extremely deficient in this respect. No systematic attempt had been made in these reports to furnish an adequate picture of the activities of the division or of its accomplishments. Information of a selected and biased nature was often used, and the total effect suggests that much emphasis is placed on individual and isolated cases, whereas the Board of Education would seem to require a careful and judicious statement of group results, and the extent to which these results measured up to the facilities available, regardless of whether they were adequate or not. Furthermore, exaggerated claims were made as to needs based on faulty statistics of the incidence and trends of disease. Such statements showed a lack of appreciation of the problem as a whole, and, consequently, the provisions made for these children were based on faulty information.

Review of Record

Forms and Office Procedure

At the beginning of its work, the Committee requested and received copies of the forms used by the Division. The number of such forms was very large, over 60, and included a number of form letters. These are of no particular interest, but it was disappointing to note that they were usually mimeographed and were on paper so cheap and, moreover, mimeographed so badly that, constituting as they often do the only direct contact of the office with the public, they must give many persons a poor impression of the office management of the Division.

Other record forms used by the Division are similarly set up, and while these may be suitable as temporary records, it is certainly not a practice to be encouraged in an administrative office dealing with large numbers of children, some of them for a period of many years. It is apparent, moreover, that some of the form letters and some of the forms must be so infrequently used that the economy of printing them is rather dubious.

The storage facilities for some of the current records was inade-

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quate. Many of the records were in open inflammable boxes, and sometimes clerks had difficulty in finding them. Certainly, the facilities for keeping records were not up to a reasonable standard.

In general, the fundamental records of pupils are kept on an annual basis. There is no continuing record or even a file devoted to each pupil coming under the care of the Division. Furthermore, the records are not so kept that the administrator can ascertain the makeup of the classes or tabulate significant data regarding them. *Even an enumeration of the numbers in the class can only be made from the routine attendance reports received from the schools.*

Each set of files contained, for the particular year, the cards arranged by schools. The records for the classes in each school were further sub-divided into admissions, transfers, discharges and pending cases.

Records were reviewed to see how the system was coordinated and how well it functioned, but it was this type of information which the Committee was prevented from securing because permission was withheld by the Assistant Director in Charge of the Division. The results of sampling of such records as were seen revealed the following deficiencies:

- a) Inadequate diagnosis or no diagnosis, and omissions of other information requested.
- b) No indication as to whether examination report was for admission, transfer or renewal.
- c) The use of improper record forms.
- d) Filing of records not kept up to date.
- e) No records at all for some pupils.
- f) Children assigned to special classes for apparent minor defects, i.e., flat feet, poor posture, and also children having no orthopedic defects.

Practices of Admission to and Discharges from Special Classes

The supervision of the children in the classes for orthopedically handicapped children from the physical standpoint is stated to be carried out by the Assistant Director in Charge of the Division of Physically Handicapped Children, and in varying degrees by the

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principals of the schools in which they are located. As assistants in the Division, there are three teachers from the special group who teach these children. These teachers are assigned to the Assistant Director's office for tours of duty which are considered as part of their training. The personnel of the office is completed by several clerks.

The Assistant Director is the official who decides whether an orthopedically handicapped child belongs in a special class, and if so, who makes the assignment to such a class. It also is incumbent upon the official to decide whether a handicapped child has so far recovered as to be able to attend a regular class.

There are no regular channels through which applications are received for the assignment of a child to one of the special classes. Such requests may be received from the principal of a school in which a child has been entered, from the child's parent or from a physician. When such a request is received a card form is sent to the child's family physician or to the physician in the clinic in which the child is being treated. This calls for information as to the diagnosis, nature of the disability, whether apparatus is being worn, whether the child can climb stairs, nature of exercise recommended, mental status, and whether the physician recommends admission to a special class. From the data contained upon this card, the decision is made as to whether the child shall be admitted to such a class.

As a matter of procedure, the recommendations of the physician signing the card are followed in admitting a child to such a class, if approved by this Division and the parents give their consent. The school health officers have nothing to do with the selection of pupils for these classes. These children may be referred to the school physician for special attention, but they are not given routine examinations.

When defects are found to be of a more serious nature, the child is recommended to the proper agency or clinic for treatment and guidance. In such cases the school nurse informs the proper authority of the defect so as to prevent any extra strain being placed on the child.

In special instances, when there appears to be dissatisfaction on

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the part of the parent, the child is called to the Assistant Director's office, but it is not considered the function of this official to examine the child, and there are no facilities for so doing. Occasionally a physician, who happens to be in another department in the same building is requested to examine the applicant, but this is stated to be more for the purpose of satisfying the parents than for any other reason.

The criterion for admitting a child to a special class is stated to be whether he is able to get about well enough to take care of himself with normal children, without danger or accident, and particularly whether he would be able to get out with the class in a fire drill. It is considered that in many cases, the physician who is caring for the child does not understand school conditions, sufficiently well to pass upon this point. Attention is called to the fact that the principals of the schools are personally responsible for the safety of the children and that it is unfair to subject them to any risk in this regard.

The mechanism for transferring a child from a special class to a regular class supposedly is the same as that for admission to a special class. Again, the request for such a transfer may come from a parent, teacher or physician. After a child once has been entered in a special class, the same form is submitted to the physician at the beginning of each term, who then has the opportunity of stating whether he still thinks that the child should remain in a special class. The Assistant Director is said to be more careful about transferring a child from such a class, than about admitting him to it, for the reasons previously stated. The case may be decided from the data contained upon the card or the decision may be postponed until the Director sees the child at one of the periodic visits to these classes. The Director is reluctant to transfer a pupil during a school term because it is felt that this may jeopardize chances for promotion. Since the cards from the physicians are not received until after the beginning of the term, it would seem that there was little chance of a request for transfer from a special class being acted upon until the beginning of the next term.

The records of the children in the special classes which are kept in the Assistant Director's office consist simply of a file of cards

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which are made out by the physicians caring for the children at the beginning of each term. These cards are filed by schools, and there is no index to them. It is necessary, therefore, to know what school a child attends before his record can be found. Although these cards, which contain a meager description of the physical disability, constitute the sole record in the central office and are, of course, supposed to be on file there, instances occur where such cards are retained by the teachers in the schools.

Supposedly more complete records of the children's health, attendance at clinics etc. are kept by the teachers in each school but it was found that there is no uniformity in keeping them.

It developed from inspections of the classes in various schools that there is very little liaison between the school and the clinic. The teacher and the central administrative office know little about the child's physical handicap and problem, and the physicians caring for these children know practically nothing about the school problem. Nurses from the Association for the Aid of Crippled Children, and the Visiting Nurses Association of Brooklyn perform excellent service in this connection, but they are, of course, not officially in the school system. In some cases a careful attempt is made to have the children attend their clinics regularly. In others, this is not so. It is our conclusion that even if it could be admitted that the system for the administration of the special classes for handicapped children could be called satisfactory, the machinery for carrying it out is entirely inadequate. It obviously is impossible for the Assistant Director personally to supervise approximately 2,400 orthopedically disabled children of all categories for whom that official is responsible in addition to the other types of classes for handicapped children administered by the Division. The staff is entirely inadequate, and the office is overburdened with a mass of work and detail with which it cannot possibly cope. The Assistant Director receives so many communications daily that it is sometimes weeks before they are answered.

The record system is bad and does not permit the necessary check up on the condition of the children in these classes.

A better method for determining the need for admission of a child to a special class is necessary and, equally important, a better

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method for keeping a check on his condition while in these classes and for deciding at the earliest possible time when he can be transferred back to a normal class, is a necessity.

Some of the principals acknowledge no administrative relationship with the classes for handicapped children, except that they are held responsible for the safety of the children within their buildings. Where this administrative isolation of the special class in the regular school building exists, it was observed to affect the child's orthopedic situation in several ways:

(1) The principals because they do not feel responsible for the special work in the class, are not in a position to urge the institution of special care such as therapeutic work, and

(2) They are frequently unduly alarmed about the safety of the crippled children and so are reluctant to have children admitted to their schools who cannot move freely and quickly through the halls in case of emergency.

THE EDUCATIONAL PROGRAM

Organization of Classes

The classes in thirty-four of the forty elementary schools in which special provisions are made for orthopedically handicapped children were visited by the educators and physicians participating in the study.

In some schools there were single classes and in others groups of two, three and four classes for orthopedically handicapped children. Although the groups of two, three, or four classes were spoken of as centers, the organization was that of single classes. There were no additional educational opportunities offered even where there were a number of classes grouped in one building, such as cooking, sewing, shopwork, and art. The grouping of two or more classes in one building should provide an opportunity for wider curriculum offerings and other advantages for the handicapped. It is perhaps unreasonable to expect a principal of the school with responsibility for one, two, or three thousand normal children to give close attention to the organization in a unit of two, three or

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four classes of exceptional children in his building. He could, however, be given authority to designate one teacher as head teacher with the responsibility for the smooth functioning of a unit of classes.

Qualifications of Teachers

The committee has reviewed the present requirements for the license to teach classes for orthopedically handicapped children issued by the Board of Examiners of the Board of Education in October, 1938. Insofar as it is able to judge them, they appear to be generally satisfactory. The questionnaires returned by the teachers of these classes indicated that the majority of them have met the special academic course requirements by taking courses given by the Assistant Director in charge of the Division. The Committee does not have sufficient information concerning the content of these courses to be able to judge their adequacy.

An analysis of the questionnaires returned by the teachers showing the amount of their academic training indicated that only a small minority of the teachers have taken courses specifically related to the education of orthopedically handicapped children since their appointment to their present positions. The observations of the members of the committee have led them to the conclusion that there is a need for an in-service training program which will acquaint the teachers with more up-to-date methods for organizing and teaching special classes and with the conditions from which their children suffer. A number of the teachers expressed to members of the committee the wish that they could have latitude to develop a more adequate program for their children. The Committee is of the opinion that the present staff under a leadership which would encourage initiative could accomplish far more than it is now doing.

Educational Classification of Pupils

The chronological ages of pupils ranged from six to 20 years. There was little factual evidence of the mentality of the children.

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The teachers reported that children of all grades of mentality were admitted to their classes, and that these varied from the mentally retarded to the mentally superior. Intelligence quotients, when determined at all, were obtained as a rule by the use of group tests. The I. Q.'s varied from 40 to 120 according to the teachers' reports.

Individual psychological examinations are not generally made. In a few instances the psychological service of a medical center or of the Bureau for Children with Retarded Mental Development were used.

Achievement and diagnostic tests are little used and no evidence seen of any aptitude testing.

Grouping of Children

In the schools having single classes the children ranged in age from 6 to 18 years of age and were from all grades in the elementary schools.

In the schools where there were two or more classes for the orthopedically handicapped children, the children were grouped according to school grades. There was no apparent attempt at social groupings by having children placed according to chronological age or social maturity. In the classes where the children were from the first, second or third grades, for example, the children would often range from six to fifteen years of age.

It is generally considered poor educational procedure to keep older children in the lower grades. Few schools would have fifteen year old children in the second or third grades. Children old enough to be in the Junior High School were frequently found in the lower grades in the orthopedic classes even when there were three or more classes in one building which made it possible for them to be placed with other children of similar maturity.

Seventh and eighth grade pupils in orthopedic classes were in the schools where the highest grade for normal children was the sixth. The members of the Committee inquired where the reported social contacts with normal children for these handicapped children were made in the school. Some of the teachers claimed they ar-

ranged for suitable contacts outside of the school. This is certainly most commendable. However, the reason given for having the special classes in the regular schools is that these handicapped pupils are enabled to benefit from being with normal children of their own social interests. Obviously this is not possible if crippled children are assigned to schools designed for younger pupils. This is merely an example of the loose thinking that is being done in connection with the education of the handicapped.

Age Span and Grade Span

An analysis of questionnaires sent to all teachers of classes for orthopedically handicapped children revealed that there was only one class with an age range as low as two years and ten months. The maximum age span was eleven years and six months; the median was six years and eight months.

The minimum of three half-year grades was found in three classes. Two classes were found to contain 15 half year grades; the median number of half years grades was seven.

TABLE II
Distribution of Orthopedic Classes by Range of
Half Year Grades in Each Class

Half Year Grades

Grade Range Within Class	3	4	5	6	7	8	9	10	11	12	13	14	15
Number of Classes	3	10	17	15	16	14	10	7	7	8	1	1	2

Total Number of Classes—111

Median Number of Grades per Class—7

Maximum Range between Grades found in a single class—15

TABLE III
Distribution of Orthopedic Classes by Maximum Age Differences
of Pupils Enrolled in Each Class

Number of Years	2	3	4	5	6	7	8	9	10	11
Number of Classes	1	9	17	16	19	19	11	6	7	3

Total Number of Classes—108*

Median age range in classes was computed to be 6 years and 8 months

The maximum difference in ages between the youngest and the oldest pupils was in excess of 11 years.

* Only 108 of the 111 Classes returned the questionnaire form.

Age-Grade Progress

The results of an analysis of the age-grade progress of children in classes for the orthopedically handicapped and a comparison with a similar analysis of the status of children in the regular classes of the school system is shown in Tables IV and V below.

TABLE IV

Percentage of Children in Classes for Orthopedically Handicapped Children who are Underage, Normal Age, and Overage for their grades, Compared with Regular Class Pupils.

	Percentage of Children		
	<i>Underage</i>	<i>Normal Age</i>	<i>Overage</i>
Regular Classes	42%	44%	14%
Orthopedic Classes	6%	37%	56%

TABLE V

Percentage of Children in Classes for Orthopedically Handicapped Children who are Accelerated, Normal and Retarded for their Grades, Compared with Regular Class Pupils.

	Percentage of Children		
	<i>Accelerated</i>	<i>Normal</i>	<i>Retarded</i>
Regular	11%	62%	26%
Orthopedic	15%	35%	50%

It will be noted from the foregoing tables that the amount of over-ageness and retardation in the special classes as compared with the regular classes is significant.

Curriculum

The teachers uniformly stated that their objective was to keep the children up to the accepted academic standards for normal children. The regular elementary school curriculum is followed but because of the multiple grade classes it is necessary to concentrate upon the fundamentals and this has resulted in a narrow curriculum offering little beyond the fundamentals in most classes. There was little evidence that there was conscious planning for a balanced curriculum offering orthopedically handicapped children an education comparable to that given physically normal children in the school system, or that would help them adjust mentally to their handicaps, or that would help them improve physically.

In a few of the schools however, there is a sincere attempt to make special curricular adjustments for the children in the orthopedic

classes. For example, if the first grades were located on the first floor somewhere near the orthopedic classes, the handicapped first grade children were sent to the regular grade for their reading; if the auditorium or shop were conveniently accessible, the crippled children were allowed to share those activities. But those were rare exceptions. Curricular adjustments for the severely handicapped children are difficult to manage for the obvious reason that a sizeable group of such children is something of a disturbing element among groups of physically normal children. But even for those less severely handicapped there has been little effort to make such adjustments.

Industrial and Placement Work for Physically Handicapped Children

In addition to the academic program offered in the orthopedic classes, "hand training" is provided through a series of lessons, projects and experiences with tools and industrial arts materials. This program of work is outlined by the Bureau of Industrial and Placement Work for Physically Handicapped Children, and the classes throughout the city carry on the lessons as planned and assigned by the Inspector of this Bureau. The work outlined for the lower grades is the same for all pupils. The development of acceptable work habits was stated to be the chief objective. In the upper grades the work is somewhat differentiated and the objective is, according to the Inspector in charge, the acquisition of knowledge of trade processes. This work is so planned that it is carried on within the classrooms. Supplies for this work are purchased and distributed through the office of the Inspector in charge. To familiarize the teachers of the special classes with the process involved the Inspector and assistants in this Bureau holds regular meetings with the teachers.

Pupils in the special classes devote on the average one hour per week to this part of their program. Most children enjoy doing things with their hands even though they may not be skillful with them, but viewed from a modern educational point of view the presence of a planned and directed series of hand training activi-

ties is open to question. Present day practice of basing much of elementary school activity upon experiences also stimulates hand or manual activities. In the latter instance there is a greater chance of having the ensuing activities more meaningful to those participating in them. Practices reported throughout the country indicated that not only are crippled children in special classes and schools given an opportunity for manual expression through art and construction activities allied to a class project, but they are also given opportunities to enjoy arts and crafts activities, shop work and homemaking experiences similar to those afforded in the regular school classes.

It was reported in numerous schools that the supplies for hand work were so limited that the program was of little value. The supplies are sent from the central office, but many of them are not usable because materials that must be employed together are not furnished at the same time. Some teachers use their own funds to supplement the meager materials given them. The Committee obtained the general impression, however, that there was little interest on the part of most of the teachers in manual activities. This is understandable because of the number of different grades in the classes, the wide age differences among pupils and the differences in their ability.

If arts and crafts, cooking and serving, music and dramatics are valuable to the children of the regular grades, then they are valuable to the children who are handicapped. The members of the Committee believe that physically handicapped children need even more opportunities for creative expression than do normal children. The orthopedically handicapped children must make mental adjustments to their physical handicap. The curriculum should provide opportunities for them to make these adjustments.

Methods

In response to the question "what special methods of teaching do you use?" the answer was invariable, "The Modified Dalton Plan" or the "Contract Plan." In many of the classes the teachers had this organized very well indeed. With this plan the skills and drills of the various academic subjects of the curriculum are em-

phasized, but as stated before, the curriculum consists of little more than the 3Rs.

Speech Correction

In only a few instances were the services of speech correctionists available to children in classes for the orthopedically handicapped. The program for speech correction was surveyed by another committee which has reported upon it in detail. * A need was found for additional teachers and when the Division of Speech Correction is expanded the children in these classes should be included in its program.

Supervision

The education of the children in the orthopedic classes is under the direction and supervision of the principal of the school in which the classes are located. It was difficult to get accurate information of the amount of supervision because of the varying interpretation of supervision given by the teachers. Some teachers reported that they were left strictly alone and others said they had close supervision, "close" supervision evidently meaning that a vice-principal or principal looked into the room once a day. Some of the principals reported they had good teachers in their special classes and so left the work entirely in their hands.

Occasional visits are made by the Assistant Director in Charge of the Division of Physically Handicapped Children.

Class Relationship to School

With few exceptions the children in the orthopedic classes are completely isolated from the children in the other classes. The crippled children travel to and from school by bus and at hours often different from regular school hours. They use the playground

* *Children With Speech Defects*, a report of the Committee for the Study of Care and Education of Physically Handicapped Children in the Public Schools of the City of New York, Board of Education, City of New York, 1941.

at different hours than the children in the regular grades. In spite of this obvious isolation the principals frequently made the statement that the advantage of having the crippled children in special classes in the regular schools was that of the possibility of contact with normal children. There are advantages in having the orthopedically handicapped children in special classes in regular schools but contact with normal children is not one of them because such contacts do not occur under the present program.

Teacher Relationship to School

The teachers of special classes who were willing to commit themselves said that they had very little association with the teachers at the regular classes. They generally reported attending staff meetings where school routine was discussed. Apparently, they attended very few conferences where curriculum and educational procedures were discussed. The reasons given were:

- (1) that they have so many grades to teach in their classes they cannot take the time to attend the meetings, and
- (2) the hours of teaching being different from those of regular grades prevent their attending.

School Lunches

There is no uniformity in the provisions made for school lunches. In some schools children brought lunches from home; in others they were supplied by the W.P.A.; and some schools had their own cooking facilities. In the schools where they were observed there was apparently little attention given to habit training at these periods. If the children were not too noisy they were allowed to do much as they pleased. Little attention was given to see that children with bone and joint infections were provided with extra milk or food to aid in correcting such conditions.

Physical Facilities

The system now employed is to place small groups of classes of children having orthopedic defects in a number of already exist-

ing school buildings in various parts of the city. Seventy-four such classes are now located in 40 different schools. These buildings were not especially constructed for this purpose and suitable adaptations have not been made. Although the classrooms usually are on the first floor, it often is necessary for the children to climb at least one flight of stairs from the street. The lack of elevators in the buildings practically excludes them from participation in any school activities conducted on other floors of the building.

On the whole the classroom furniture is adequate although some instances were found in which it was old and in which the desks and seats did not fit the children.

In most cases rest facilities were lacking. There was no opportunity for the children to take rest periods in a reclining position. In many schools toilet facilities were poor. The toilets were located at such distances from the classrooms that it was difficult for some children to reach them.

Although the present system of distributing special classes among a large number of schools is theoretically better than building special schools for crippled children, because it places these children in contact with their normal fellows, in practice this is not the case. As a matter of fact, they now are isolated completely. It was the opinion of some members of the Committee that it would be far better to construct special school buildings for these children and that there should be at least one such building in each borough. These schools should be provided with enough elevators to take all of the children to their respective floors and to evacuate them quickly in case of an emergency. They should also be provided with ramps so that children depending upon wheel chairs could have the benefit of attending school. In such specially constructed buildings all of the shortcomings of the school not built for this purpose could be overcome. There could be adequate rest rooms, lunch rooms, physical therapy rooms, shops and other special rooms. It is desirable for crippled children to mingle with normal ones as much as possible but it does not seem practical for children handicapped as severely as are those who *should* be admitted to special classes to take part in the routine school activities with normal children. Under the present arrangement they

are excluded from all of the school activities outside their own classrooms. It would seem better therefore to have specially constructed schools designed to meet their special needs and to provide for more freedom of action.

The segregation of the orthopedically handicapped child can be lessened only by having a definite standard for admission to special classes. This should be decided on the inability of the child to attend a normal class without actual danger to himself. It also is important that as soon as an orthopedically handicapped child is restored to a condition enabling him to enter a normal class this transfer should be made. The investigations of the committee have shown that far too many children not in need of special class care are assigned to them.

The members of the Committee favoring separate schools believe that if the ideal is not at once attainable, at least one such building should be erected as a beginning to care for the crippled in one borough. This could serve as a model and a demonstration center which would be of value in the acquisition of further knowledge and experience that would be valuable to the entire system. Since recent statistics show that the number of crippled children in Brooklyn is almost twice that in Manhattan or the Bronx, and nearly three times that in Queens, it would seem logical that this school should be located in Brooklyn.

Until such special schools are attainable, the classes now scattered among 40 schools should be consolidated into fewer centers with more classes in each. Such units should contain at least six classes. The whole Committee is in agreement here. This would make it possible to eliminate to a large extent the multigrade classes. Children of low mentality should be placed in separate classes. Such accessory facilities as provision for adequate rest, lunch rooms, play grounds, and physiotherapy rooms should be included in the units making them essentially a special school within a regular school.

The schools in which these units are placed should be provided with elevators and ramps and the sections of the building in which these children are placed should be rebuilt to provide proper toilet facilities and all the other features above mentioned.

In very few instances are separate classes provided for children who are doubly handicapped with a mental and physical disability. This is a serious problem, because many such cases are found among the classes due to the large number of cerebral palsies from birth injuries. It is the general experience of the teachers that these children, because of their slowness in grasping ideas and their difficulty in expressing themselves, retard the progress of the others.

Transportation

Adequate transportation is an essential prerequisite if the severely handicapped are to attend school. The omnibus is the practical type of vehicle. The 33 or 40 passenger type is used. For one driver to make this number of pick-ups and returns daily implies a schedule of an hour and a half or more for each trip. This necessitates prolonged transportation for a certain proportion of the children and the child living furthest from the school is picked up first and delivered home last. In an extreme instance a child, therefore, leaves home at seven o'clock in the morning and returns at five o'clock in the evening.

Large buses have difficulties in certain sections of the city with blind streets which make turning around difficult. In these instances the children meet the bus at the nearest corner. On the whole, the drivers keep a rather satisfactory schedule, and the school principals are in possession of the time of arrival and departure each day. The attendants who accompany the children are reported to be efficient, and the general cleanliness of the buses is satisfactory.

The transportation districts are not, in many instances, laid out in such a manner that the school is situated at or near its geographic center. An example of faulty situation is in the B area of Kings County, where Public School No. 30 is located in the most inaccessible corner of the area. It is obvious that the distribution of the crippled children in a given area will vary from time to time. In the main, however, the number of crippled children bears a definite ratio to the density of population, and the schools for crippled children should be located near the centers of the districts they serve.

The Committee feels that the school buses should be owned by the City, and maned by city employees. The capacity should be fifteen to twenty children. The transportation areas should be laid out with relation to main routes of travel, in conjunction with the location of crippled children. The selection of the school should be based upon the time consumed in reaching it, rather than the distance that the children are transported. The ventilation, heating, and cleanliness of the vehicle should meet the standards of first class bus transportation. Children should be picked up at their homes and returned there.

Degree of Handicap Found in Children in Special Class

Many of the children observed in the special classes were quite lightly handicapped as judged by limitation of activity and degree of orthopedic involvment. Not more than a dozen children who were using two crutches to get about were observed in the classes by the committee.

Members of the committee found in their inspections of these special classes that there were in every case children who apparently were well able to be in regular classes. In some instances, this constituted as high as 30 per cent of the class. The majority of disabilities did not prevent the pupil from walking or doing those things relatively normal children performed in the class room. The special classes formed to care for crippled children who are limited by their handicap are caring for many children who would be better off socially and physically in a more active routine. Many children who need the special care which these classes are supposed to offer are given home instruction which, while most valuable as a final educational resort, is, to a limited degree only, a substitute for school attendance with its opportunities for social contacts, wider activities and the full time school program. This is perhaps one of the most serious situations brought out by this survey.

Teachers as a rule were not well informed as to the physical disability of the children in their classes. Where the diagnosis was known, there was very little understanding of the implications of

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the orthopedic conditions. The teachers would apparently welcome the assistance of a specially trained health education teacher or a physiotherapy technician who could take over the recreational activities, the orthopedic check-up, contact the hospitals and physicians, handle treatments and so forth.

CONCLUSIONS WITH RESPECT TO THE EDUCATIONAL PROGRAM IN CLASSES FOR THE ORTHOPEDICALLY HANDICAPPED

The Assistant Director in charge of the Division of Physically Handicapped Children has stated:

For these special classes suitably equipped for the health and comfort of the children, the courses of study are adapted to the needs of each child and also to the special types of physically handicapped children. Emphasis is placed upon the gaining of health, strength and function through rest, suitable diet, medical and surgical care and an adapted physical activity and special health program to the end that the children may improve sufficiently to return to regular classes or may be prepared to enter a life's work adapted to their abilities.

Five fundamental purposes have been considered in planning the special education of physically handicapped children in New York City: their early discovery, prompt physical rehabilitation, education and socialization by suitable school adjustment, social placement and the follow-up of their careers. *

If these are the objectives, the classes fall short of their purpose. Every teacher visited stated that the work given paralleled that of the regular grades and that no program was arranged on the basis of disabilities. The age-grade range was so great that it presented a difficult teaching problem. Small children and those ready for high school were in one class and in some cases the older children were teaching the younger ones. There could be no special education for the child's disability as very few of the teachers were able

* *Education for Handicapped Children*, A Special Report, Thirty-sixth Annual Report of the Superintendent of Schools, Board of Education, New York, New York, 1934, p. 114.

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to state the child's disability without referring to their records or asking the child. There was no work that could be called vocational being given to any child in the special classes visited.

It was evident to the Committee that a large number of children should have been placed in the regular classes of the school. The majority of disabilities did not prevent them from walking or doing most things normal children perform in the class room. As there are no special educational methods, practically no treatment given in the school, no special diets or rest periods, and no special recreation or physical activities, there appears to be little purpose to these special classes. The wide age and grade spans, the extreme heterogeneous ability groupings, the skeletonized curriculum and the isolation of the pupils from normal social contacts make these classes educationally inferior to the regular classes.

HOME BOUND CHILDREN

In the course of the study of home bound children and their potential ability to attend school, visits were made to a limited number of children who were receiving instruction in their homes. It was found in the group visited that approximately 50 per cent required home instruction because of their disabilities. This group consisted almost entirely of children severely crippled from poliomyelitis and from cerebral palsy. Approximately 35 per cent could receive instruction in special orthopedic classes. This group of children consisted almost entirely of those crippled from poliomyelitis. Their crippling was not severe enough to necessitate home instruction.

The remaining approximate 15 per cent could receive instruction in regular classes in regular schools as their physical handicaps were not severe enough to necessitate any special educational procedures.

Of the total number of children visited, it was estimated that about

40 per cent offered a reasonable prognosis for eventual economic adjustment.

35 per cent could be partially economically adjusted.

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25 per cent had questionable possibilities for economic readjustment.

Suggestions Contained in Response to Questionnaires Submitted to Principals Regarding Open Air or Health Classes

The assistant superintendents and the principals of schools in which classes for physically handicapped pupils are situated returned questionnaires which had been sent to them by the Superintendent of Schools at the request of the committee. The suggestions listed below were made for the improvement of the program.

1. The responsibilities of the principal, the teacher, the school physician and the Division of Physically Handicapped Children should be more clearly defined.
2. The principals should receive copies of instructions given special class teachers by the Division of Physically Handicapped Children.
3. The principals should receive duplicate records of findings of school health officers.
4. The clerical work now required should be reduced and simplified.
5. Psychological tests should be given to children in special classes.
6. The delay in assignment to special and regular classes subsequent to physician's examination should be eliminated.
7. There should be a flexible standard of admission according to local conditions.
8. Provisions should be made for short assignments to special classes as indicated by individual need.
9. Provision should be made for special school adjustments at the high school level.
10. Provision should be made for caring for physically handicapped children who are of low mentality.
11. Teachers should have some voice in determining whether a given child would benefit from placement in the special class.

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12. When possible, children should attend regular classes for certain subjects for example, geography, nature study and art.
13. Fuller use of visiting teachers should be made in an attempt to improve home conditions.
14. The range of grades within a single class should be reduced.
15. There should be a more ample supply of textbooks.
16. Special educational materials, notably of the individual remedial type, should be supplied.
17. Physical therapy equipment and treatments should be provided.
18. Transportation services should be improved.
19. More adequate information should be furnished regarding children's disabilities and needs.

It is evident from the foregoing that the assistant superintendents and principals are well aware of many of the shortcomings of the present program.

Teachers of Orthopedically Handicapped Children

Those responsible for the education and socialization of the crippled child should be experts in their respective fields and have specialized education in the application of their work to the crippled child. Training for this is essential, but a pleasing personality, patience and an interest in working with crippled children, are prerequisites for success.

It is the opinion of the Committee that teachers of the orthopedically handicapped should have in addition to the requirement as a special class of teachers at least two years of teaching experience with normal children of similar age. If children in special classes are from four or five different grades, the teacher should be qualified to teach the grades included in the class. To meet the needs of the child it is essential that the teacher have special preparation which should include:

1. An understanding of the conditions producing physical disabilities. Teachers who understand the causes and disabilities pro-

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duced by orthopedic diseases, are better qualified to help the child in his education and to give proper guidance. They understand the necessity for orthopedic supervision.

2. Observation of the treatment given in the clinic.

Teachers who have observed the physical therapy treatment of the various cases, the method of caring for the disabilities, talked with the physicians and technicians, and noted the attitude of the children in the clinic, have a better understanding of their children.

3. Corrective and recreational activities.

Crippled children have all the urges and desires of normal children. They are anxious to play the games of normal children though they may not have the capacity to do so. The teacher knowing this and the special treatment being given may supplement the treatment by appropriate activities and adapt the recreational program to the disabilities. To teach children activities they can perform in spite of their handicaps is an important part of the educational process.

The teacher should be able to teach the child drawing, weaving, knitting, and the numerous and interesting forms of arts and crafts adapted to the classroom and the child's disability. These are useful for the child's recreation and may also be employed to strengthen and stretch contracted muscles, and increase the movements in joints.

4. Psychology of the handicapped child.

The personality and social adjustment of the handicapped child is an important part of the teacher's duties. It is essential that the teacher understand the psychology of the handicapped child.

5. Methods of organizing and teaching multiple-grade classes.

The teaching of classes in which there are children of many grades requires different techniques than those employed in classes of a single grade. If teachers are to teach multiple grade classes they should be trained in methods of organizing and conducting such classes so that they may utilize the time at their disposal to maximum advantage. The present contract plans in use have in a majority of the classes visited reduced the educational program for those children to little more than drill in the essential processes.

The Physical Education Teacher

Every physical education teacher should be familiar with the signs which cause, or result from diseases producing physical defects. The flaccid muscles of infantile paralysis, the spastic muscles of cerebral palsy, the characteristic position of the arm and hand in obstetrical paralysis, etc., should be recognized and understood by those responsible for the physical education of these pupils. Every teacher responsible for special physical education should have appropriate training. When a definite pathology exists and when a teacher assumes responsibility for a case without sufficient knowledge of the disease and the procedure to be followed, it may prove harmful to the pupil.

PHYSICAL THERAPY AND PHYSICAL EDUCATION

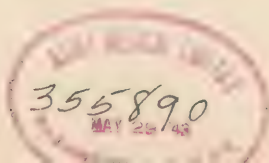
Physical Therapy

The Committee with the assistance of additional physiotherapists undertook to determine the extent of the need for physical therapy in connection with the special classes for orthopedically handicapped children and to study the existing services. To do this classes in twenty-three schools were visited.

Neither the Department of Education nor the Department of Health provide any physiotherapists, consequently little therapeutic care is provided in the special classes in the public schools. In some schools physiotherapy is provided by voluntary agencies, one of which is the Association for the Aid of Crippled Children, whose nurses give treatment to children after receiving a physical therapy order signed by the physician in charge of child, by the parent and by the Director of the Division of the Physically Handicapped Children. Not all types of orthopedically handicapped people need or improve under long continued therapeutic care. Of those receiving medical supervision, a large number do not receive physical therapy treatment. The principal types of conditions benefited by physical therapy are:

Infantile Paralysis Cases

Of a group of 139 children who had infantile paralysis, three children were given therapeutic care in school, 24 were having some



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form of exercise care outside school (in 2 cases at least this was chiropractic care), although most of them returned regularly to their physicians or clinics for medical check-up.

Intracranial Inquiries

(Spastic and Athetoid Paralysis)

Of a group of 47 children with intracranial injuries 2 were having therapeutic care in school, 7 had some form of regular care outside, and 38 children had no treatment.

A child's health is the responsibility of the medical profession, but a child's health problem becomes also a problem of the Department of Education and the Department of Health. It is a problem that can be successfully solved only by the active cooperation of all. Only by the continued cooperation of the Department of Health and the Department of Education will it be possible to lay a lasting foundation in the schools for the prevention and correction of physically handicapped children included in the following groups:

1. *Postural cases.* Body mechanics is a more comprehensive term which includes faulty position and function of feet, knees, hips, pelvis, spine, chest, neck and head, or any part of the human body that helps to make it a human machine.
2. *Scoliosis* or curvature of the spine.
3. *Poliomyelitic* crippling.
4. *Spastic* children or victims of cerebrosplastic paralysis.
5. Temporarily handicapped children with physical defects resulting from injury or other disease.

Body Mechanics

Faulty body mechanics are a combined problem for orthopedic surgeons and physical educators. Much of the work dealing with the discovery and treatment of children with poor body mechanics has been done by members of the physical education profession and much credit is due them. Of late more and more physicians are emphasizing the relation of proper body mechanics to patho-

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logical conditions found by orthopedic surgeons, pediatricians, obstetricians, gynecologists, etc. The body mechanics, therefore become more than an aesthetic problem and must be considered primarily from the medical point of view.

In the corrective gymnasia of orthopedic hospitals are seen a great number of children of school age. They make up a group which often loses three half days a week from their school work. It is desirable that many of these children receive their corrective work in the schools under the supervision of the physical education department.

In reviewing the ages of children with postural defects, it is found that most of them are of high school age. The elementary schools at present have not the facilities for screening out or advising the children with faulty body mechanics. These defects are more easily corrected in younger children or when they are discovered earlier. The play period that now constitutes the physical education in the elementary schools is desirable but it would be more efficient if some effort were made in these grades toward body mechanics examinations and advice and if corrective treatment were given similar to that given in the high schools. Corrective treatment does not always mean corrective exercises. Many children with poor body mechanics need rest more than exercises and some of them need proper nutrition.

The only check that the teachers have on the physical history or treatment of their pupils is the medical card signed by a physician. Each child in the orthopedic class must bring such a card. The card states how many times per month the child is to see his physician or attend the clinic. It should be a responsibility of the school authorities to determine whether or not such visits are made.

There are very few facilities in the schools for a corrective program. The question of treatment for the group as a whole varied in every class. Some children go to their own physicians and clinics after school hours but the majority do not receive any adequate attention or check-up. It seems the parents and the school have no systematic plan of either treatment or follow-up.

Although the physician who is caring for each child is required to approve such treatment before it is undertaken and is asked

to indicate what kind of treatment shall be given, there is no real contact or understanding between the physician and the physiotherapists who are working in the schools about this work.

In the main, the children are taken to the various clinics in which they are registered for physiotherapy. Transportation is provided for a limited number of children by the Association for the Aid of Crippled Children, without which, in most instances, it would be impossible for them to reach the clinics. In spite of this in most cases at least half a day is consumed in going to and from the clinic. In many cases visits are not as frequent as would be desirable. The question is raised whether these serious interruptions in the school routine are justified by the short treatments, amounting often to only a few minutes, and whether they are advisable considering the fatigue incident to traveling to and from the clinics.

The requirements could be met more easily, with far less effort and without detriment to the child's school work, by providing a room and a technician for physiotherapy in each unit of classes for crippled children. The necessary equipment would be quite simple. The technician should be a qualified physiotherapist and should work only in close cooperation with the physician or clinic treating each child, and always under the prescription of the physician. In no case should such treatment be given when a child is receiving private care.

Selection of Children With Orthopedic Disabilities

Those doing orthopedic work are agreed that something should be done about the increasing number of orthopedic cases which come to the clinics too late for the simpler forms of treatment which could have corrected the condition if they had been discovered and treated earlier. To prevent many children from becoming orthopedic cripples, it is necessary to examine the children in the elementary grades. Defects found during the earlier years of life are more amenable to treatment as the bony framework is more plastic.

The orthopedic problem could be corrected to a large extent

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if the school would follow the same procedures for discovering orthopedic disabilities as they do for visual and hearing defects. The nurse, classroom teacher and physical educator are allowed to test children for visual acuity and special teachers are trained to give audiometer tests to screen out those pupils with below normal hearing. There is no reason why teachers cannot be taught how to discover orthopedic conditions. In examining for orthopedic defects it would not be the function of the teacher to say why the pupil limps, or why the posture is poor or spine curved, but to select the children who have these conditions for an examination by a physician or orthopedist. The problem of discovering orthopedic defects, and preventing increased deformity in those having them should be undertaken by the schools. As the majority of school systems have assumed the responsibility of the crippled child's education, vocational training and adjustment to society, so they should assume the responsibility for early detection of crippling conditions and see that children are directed to the proper places for treatment.

The success of any vocational program for handicapped individuals is in many cases dependent upon the medical and physical treatment in their earlier years. When examined medically at vocational training or working ages, it is not infrequently found that had periodic medical examinations been made in the earlier years and treatment given in accordance with the findings, the extent of the current disability would have been lessened and in some cases been non-existent. Lessening of the extent of the disability of an orthopedic child either reduces or makes unnecessary the need of special educational facilities in his earlier years and later when he reaches working age enlarges the scope of life occupations he may undertake, thereby permitting him more choices with which to meet his vocational desires and interests, with consequent happiness and success. Any procedure which reduces the number of orthopedic children needing special educational facilities is economical to the community and of great social value to the children because it permits many to attend the regular schools without the added expense of special facilities and far more important, it prevents any emotional or other maladjustments which might be

caused by segregation and lack of association with the physically normal.

The Commission for the Study of Crippled Children recommended the establishment of a Coordinating Service in the Department of Health, the primary functions of which should be the maintenance of a central registry of crippled children under 21 years of age in the City and to provide initiative and guidance in the coordination and development of services for the prevention and treatment of orthopedic handicaps in childhood. This Coordinating Service should have reported to it all cases of orthopedic disability and it should procure reports from hospitals, clinics and nursing services for orthopedically handicapped children. Cases in need of corrective treatment who are not receiving it should be referred to the proper agencies.

Physical Education

There is a basic need for special physical education of orthopedically handicapped children because of the relative inactivity of the crippled child; the need for protective care; the need for an activity program and an environment allowing for social adjustment, and the need for fulfilling psychological and emotional requirements.

Such a specialized physical education program is an essential part of the school program for children with orthopedic disabilities. From this program there should be expected the following:

1. A correction of the majority of functional conditions, such as, poor posture, flat feet, etc.
2. The maintenance of good musculature following illness and operations.
3. A program of activities for the crippled child which will give him the satisfaction derived from success in sports and the ability to compete with the normal person in certain activities.
4. An inventory of the individual's ability to perform the movements most essential for daily living, and a program of activities based upon the findings which will aid in his education for safety, vocational training, and social adjustment.

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The New York State Education Department subsidizes teachers for classes for physically handicapped pupils in the elementary grades. In addition it subsidizes the provision of physical education in the elementary school system. Advantage of this subsidy has not been taken by the New York City elementary schools. Although in the secondary schools physical educators are provided, there is no specific provision for physical educators whose responsibility it is to provide physical education to orthopedically or other handicapped children.

The present program of physical education in the high schools could easily be extended to include the supervision and treatment of children with physical handicaps. The diagnosis and follow-up should be in the hands of the medical profession possibly through the district health units of the Board of Health for those pupils not under the care of private physicians. The actual treatment that now falls mainly on the orthopedic hospital clinics could be partially carried out in the schools if the proper liaison exists between the trained physical therapists, physical educators and the hospitals. No physical education should be given to orthopedically handicapped children, however, unless approved by the physician in charge of each case.

If the physical education program is properly planned and directed, there will be no conflict with medical or other agencies also interested in the child's care. The school should never be in the position of providing the type of orthopedic care which is better done by hospitals, clinics, or private physicians. Its contribution to the child's orthopedic and social welfare should be rather as an intermediary agent, offering him protection, continued simple therapeutic care, based on the attending physician's recommendations, and the opportunity to develop wider fields of activity as a step from hospital care to his eventual independence as a member of his community.

In many cities physical educators are assigned to the elementary, junior and senior high schools. A review of the teaching program should show that where more than one is assigned to a school they specialize in certain phases of the school program, e.g., coaching, swimming, football, track, and so forth. Physical educators are se-

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lected because of their knowledge of special phases of physical education. If the problem of the physically handicapped pupil in the schools is to be solved, it will be necessary to employ teachers who are specialists in this phase of physical education.

In the New York City secondary schools there are from five to twelve physical educators in each school. Practically all of these schools have special physical education classes for those not able to participate in the regular program. It would be of great help to the pupils in the classes for crippled children in the elementary schools if they were under the direction of physical educators who are trained for this work.

Recreational work may be good for some cases but undesirable for others. Swimming is one of the most beneficial forms of exercise and recreation. How valuable from the point of view of physical development this type of recreation is to the physically handicapped child depends entirely upon the emphasis given to muscle training and re-education in the recreational program. Swimming alone does not take the place of localized muscle training and re-education. Unrestricted and unsupervised swimming indulged in by physically handicapped children may be extremely harmful. In swimming the stronger muscles are exercised at the expense of the weaker. The purpose of muscle training and re-education is to train and re-educate the weaker muscles. Unsupervised swimming is the antithesis of this therapeutic measure. In any plan for the use of a swimming pool for physically handicapped children it is most important that major stress be put upon the training and treatment to be provided. The facilities for muscle training and physical therapy and professional supervision by orthopedic surgeons should be the nucleus around which plans for swimming pool use are based.

Braces are placed on children sometimes to prevent the strong muscles from overpowering those weakened by disease and to prevent deformities. To remove these braces and teach a child to swim by *using the strong muscles* to produce movements of the limbs may increase the deformities and defeat the purpose of the muscle re-education program. The trained physical education teacher realizes the necessity of training the weak muscles to produce the move-

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ments, so that they may be increased in strength and balance the pull of the strong muscles. Often when this is accomplished the brace may be discarded. Swimming as well as all other recreational activities of the child handicapped by orthopedic defects should be only on the basis of the prescription of the attending physician.

There are three important considerations regarding forms of treatment which may be recommended for children having physical disabilities:

1. Certain conditions require the care of an *orthopedic surgeon*.
2. Other disabilities may be given treatment by the *physical therapist*.
3. Certain functional conditions, which may be corrected by special group exercises, may be cared for by the *physical educator*.

The place of physical education in the treatment of the functional conditions which may be corrected by special exercise classes in the schools and the contribution this program may make to the rehabilitation and socialization of the crippled child are indicated below. Such treatment should be based upon the attending orthopedic surgeon's prescription.

In every school system there are always a number of pupils, who, because of injuries or sickness, cannot participate in the regular school physical education program. The usual procedure is to excuse these pupils from activities. Physicians and surgeons usually advise their patients not to participate in physical exercise for a short time, and the patient may interpret this "short time" to be from several months to several years. Under the direction of a physical educator with special training in the adaptive and restricted program for pathological conditions, these children can be given special exercises which will aid them into a more speedy recovery by keeping up the tonus of the muscles. It also prevents the development of that common condition, exercise phobia, which in later years leads to those disabilities resulting from weak musculature.

In every school there are crippled children who have received the maximum aid possible from medical science. The children with

deformed backs, ankylosis, atrophied muscles and amputated extremities are excused from physical activities and are forced to become spectators instead of participants. The desires and emotions of these children are the same as those of normal children. These crippled children should be allowed to participate in the sports they are capable of performing and thus satisfy their natural urges.

Organization of Special Physical Education Classes

The success of these classes depends upon an understanding of all the factors involved.

The physical educator must have special training for this work. He must be familiar with the diseases which produce the disabilities, and what the orthopedic surgeon and physical therapist have accomplished. The New York State Department of Education issues a special license for physical educators who complete this graduate study.

It is not the function of a physical educator to take individual pupils for special exercises. If a pupil's condition needs individual treatment he should be sent to his orthopedic surgeon or to a clinic or school where this treatment can be given by a physical therapist.

Recreational activities accomplish more than formal exercises. Relay races carrying marbles under the toes, catching and throwing a basket ball with the feet, etc., are excellent exercises for the muscles of the feet and more interesting for the pupil than the formal exercise performed to counts. The use of the movements suggested for strengthening weak feet is an interesting competitive activity and makes the corrective program a satisfying experience.

The success of the program for children with structural deformities, who have obtained the best results possible, depends upon their proper classification in groups. In classifying the children there are two important factors to consider (a) the part of body in which the disability occurs, and (b) the social age of the pupil.

These children must be classified by the part of the body in-

volved and not by the disease which produced the disability. The ability to participate in an activity depends upon the use of the various parts of the body. Children with artificial legs, or flaccid paralysis which necessitates wearing braces or those with fused joints, all have the same handicap from the standpoint of participation in athletic sports.

A person with a disability of one leg may become an expert in gymnastic apparatus in swimming, archery, rifle shooting, bag punching, etc., while one with an arm disability may develop expert ability in tennis, badminton, bowling, soccer, fencing and running.

The social age of the child depends largely upon the period of life in which the disability occurred. If the disease which produced the disability occurred early in life, then he did not have the opportunity of playing the games of childhood and is usually lacking in the fundamental skills necessary for success in sports. It may be necessary to teach the individual how to catch, bat, or throw a ball, before placing him in a game situation.

The Physical Achievement Test

Physical educators have developed many testing procedures for the normal individual but little work in the testing field has been designed for the crippled person. These tests in so far as they are applicable, should be used to discover the physical abilities of handicapped children. It is important not only from the recreational standpoint, but it is a necessary educational procedure in measuring the ability to adapt to physical activities.

Children have been discharged from hospitals with the maximum amount of improvement possible, only to find themselves homebound because they could not lift their feet to a height of eight inches and, therefore were unable to go upstairs, get in a bus or car, or even step over a curb. It is necessary for a crippled child to be able to go through doors which open outward or inward, get up if he should fall, and many other acts which the normal person seldom thinks about. The physical educator knowing the limitations of the individual, can direct his physical activities so

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that he learns to increase his speed on crutches, get over curbs and up steps, walk backwards, and develop compensatory movements to help him in his vocational training and social activities.

The Physical Education Teachers

The Committee believes that every physical education teacher should be familiar with the signs which cause, or result from diseases producing physical defects. The flaccid muscles of infantile paralysis, the spastic muscles of cerebral palsy, the characteristic position of the arm and hand in obstetrical paralysis, etc., should be recognized and understood by those responsible for the physical education of these pupils. Every teacher responsible for special physical education should have appropriate training. When a definite pathology exists and when a teacher assumes responsibility for a case without sufficient knowledge of the disease and the procedure to be followed, it may prove harmful to the pupil.

VOCATIONAL EDUCATION

In June 1939, at the request of the Committee, Dr. Harold G. Campbell, Superintendent of Schools, dispatched a questionnaire prepared by the Committee to the principals of each of the vocational schools of the public school system. The questionnaire requested the principals and the teachers to furnish information concerning their respective schools, as follows:

1. Names of the different courses given in the school.
2. The total enrollment in each course.
3. The number of orthopedically handicapped included in the total enrollment in each course.
4. The names, courses and descriptions of disabilities of the orthopedically handicapped pupils enrolled.

The principals of the schools were asked what types of orthopedically handicapped persons could undertake each course of study provided they had the other qualifications necessary for a successful pursuit thereof, number of floors to the building, and whether there were elevators and to extend their remarks to anything pertinent to providing orthopedically handicapped persons with vocational trade training. The information requested in the questionnaire was given as of June 1st, 1939.

Responses were received from 23 schools, 22 of them giving complete answers to the questions asked as to enrollments and one stating merely that it served no orthopedically handicapped students. The following table gives the total enrollment and the orthopedic enrollments of the schools reporting as of June 1st, 1939.

VOCATIONAL EDUCATION

TABLE VI

Total Enrollment and Orthopedic Enrollment
of Each School as of June 1, 1939

					Total Enrolled	Total Orthopedic Enrollment	Elevators
	Vocational	High	School	A	808	9	Note (d)
	"	"	"	B	675	8	No report
Note (a)	"	"	"	C	1,524	6	None
	"	"	"	D	2,943	5	Yes
	"	"	"	E	2,263	5	None
Note (b)	"	"	"	F	1,675	11	None
	"	"	"	G	1,957	0	No report
	"	"	"	H	1,991	1	Freight
	"	"	"	I	1,950	11	Freight
	"	"	"	J	1,232	11	None
Note (c)	"	"	"	K	1,752	3	None
	"	"	"	L	754	0	None
	"	"	"	M	3,100	0	Note (e)
	"	"	"	N	1,384	6	Yes
	"	"	"	O	3,138	6	None
	"	"	"	P	1,738	2	None
	"	"	"	Q	1,487	0	None
	"	"	"	R	2,497	7	Yes
	"	"	"	S	1,477	2	None
	"	"	"	T	Not reported	0	Yes
	"	"	"	U	2,595	11	Note (d)
	"	"	"	V	1,566	4	None
	"	"	"	W	2,637	3	None
Totals 23					41,143	111	

Note (a) Does not include exploratory or tryout courses; continuation 4 hrs per week; or 4 orthopedic cases discharged during term from High School.

Note (b) Does not include Ninth Year Tryout.

Note (c) Includes 2 orthopedic tryout cases.

Note (d) Has elevators for trade course but none for non-vocational courses.

Note (e) Elevator in main building, none in annex.

On June 1, 1939 out of a total enrollment of 41,143 students in 22 of the 23 vocational schools, 111 are recorded as orthopedically handicapped. This is a prevalence of 2.7 per 1000. The known prevalence of crippled children under 21 years of age is given in the Report of the Commission for the Study of Crippled Children as 6.4 per 1000 of the 21 years of age. Of all children under 21 years of age about 33% are between the ages of 14-18 inclusive.

VOCATIONAL EDUCATION

Five of the schools reported no enrollment of orthopedically handicapped students.

These five schools give courses in:

Auto Mechanics	Costume Design and Illustration
Electric Wiring	Jewelry Design and Art Metal
Electrical Installation	Aviation Mechanics
Plumbing	General Industrial
Printing	Radio Mechanics
Woodworking	Sculpture and Stone Carving
Pattern Making	Shoemaking and Repair
Machine Shop	Beauty Culture
Sheet Metal	Household Arts
Bookkeeping	Needle Trades
General Commercial	Commercial Art
Stenography	Commercial Photography

The principals of two of the five schools which reported no orthopedic enrollment gave no reply to the question as to what types of orthopedic disabilities in their opinion may undertake the courses given in their schools. The other three replied as follows:

"There are four floors in the building and with the exception of the main staircase, all staircases are very narrow. There is no elevator in the building.

"It would be impossible to train students who were handicapped with a hand disability or a leg or foot disability, e.g., in a case where crutches must be used. Navigation for these people would be extremely difficult."

"In my opinion, a boy who has lost one leg for which loss an artificial leg is substituted, may profit from instruction in aviation mechanics. A boy with one leg on which there is a stiff joint or club foot, can profit from instruction. A boy with spinal curvature which is not too prominent, may profit from instruction."

"It is my opinion, however, that in cases of leg disabilities, efficiency is impaired. Employers may reject applicants for employment who have these disabilities. It has been our experience in placement work that this factor is important. We are therefore reluctant to accept students with such physical handicaps."

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"The physical set-up of these buildings precludes the possibility of admitting orthopedically handicapped pupils in any great numbers. The facilities we have would permit instruction only for those who fall within the group characterized by partial disability of lower extremities."

"Where the handicap will permit the person to ascend stairs, the following possibilities exist for those whose disability requires sedentary work:

Shoe Repair	—Cobbling, leather novelties.
Radio Mechanics	—Radio repair in small shops.
Wood Carving	—Studio Work.
Sculpturing	—
Auto Mechanics	—Bench work in rebuilding carburetors, generators, starters, distributors. Employment in small shops.
Electrical Shop	—Bench work in repairing and rebuilding electrical accessories, e.g., lamps, vacuum cleaners, toasters, armature, winding, etc.
Drafting	—Mechanical drawing.

These comments of principals of three of the five schools which had no orthopedic enrollments are quoted as showing that there appears to be no inherent prejudice on their part against the orthopedically handicapped undertaking training and instruction. Their concern seems to be principally in the matter of safety and ability to climb stairs and to the probable difficulty of placement after training.

As to the concern for safety, if, as has been reported, the principals are held personally responsible for the safety of their students, it is natural that their attitude toward the enrollment of crippled children would be a cautious one. The committee has been given advice however that there is no liability for personal injuries suffered by students provided (1) they are accepted for school placement upon recommendation by competent medical authorities and (2) the injury is not due to negligence on the part of school officials.

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Of the twenty-three schools reporting; 12 have no elevators; 2 have freight elevators only; 3 have elevators for either vocational or non-vocational work but not for both; 4 have passenger elevators and 2 schools made no report in the matter.

Thus of the twenty-one schools reporting, 17 have no full elevator service. This naturally precludes the enrollment of these orthopedically handicapped who cannot climb stairs due to their disabilities but it does not preclude the attendance of those who can. The four schools having elevators provide instruction in 26 of the 84 different vocational courses given in 22 of the 23 schools reporting.

In the metropolitan area the majority of commercial organizations engaged in the trade and vocations taught in the vocational schools are located in structures which either have freight or passenger elevator service or both or are located on the street level. Lack of elevator service or lack of entrances on the street level in the vocational schools precludes the attendance of some crippled pupils who may be capable after training of being gainfully placed in employment in industry in the trades taught. Such lack of facilities requires in some cases that in order to obtain training the crippled students must meet conditions which they will not have to face later in commercial employment.

There should be street level entrances or ramps and elevator service in the existing vocational schools and such facilities should be provided in new buildings.

The following table gives the total enrollment and the orthopedic enrollment in each of the courses reported as being given in 22 of the 23 schools on June 1, 1939. Eighty-four courses were reported but for the sake of brevity similar courses reported under slightly different names have been grouped.

TABLE VII

TOTAL ENROLLMENTS AND ORTHOPEDIC ENROLLMENTS

<i>Courses</i>	<i>Total Enrollment</i>	<i>Orthopedic Enrollment</i>
1. Architectural and Mechanical Drawing and Drafting	480	4
2. Automotive Trades	5161	7
3. Aviation Trades	3534	1
4. Beauty Culture and Barbering	1772	5
5. Bookkeeping and Commercial	1376	10

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6. Building Maintenance	389	1
7. Cafeteria and Tea Room Training	646	2
8. Clerical and Stenography	2909	4
9. Clock and Optical Mechanics	35	1
10. Clothing, Millinery Trades	5724	34
11. Commercial Art, Designing and Illustration	1045	2
12. Commercial Photography	156	0
13. Dental Assistants	16	0
14. Dental Mechanics	178	1
15. Electrical Trades	4666	3
16. Foundry Trades	83	0
17. General Industrial Courses	1890	6
18. Graphic Arts (pre-vocational)	68	0
19. Heating and Sanitation	88	1
20. Homemaking	614	2
21. Home Nursing	811	2
22. Industrial Art	61	0
23. Jewelry Design and Art Metal Work	211	
24. Leathergoods Manufacture, etc.	125	0
25. Machine Shop Trades	1608	3
26. Marine Occupations	290	0
27. Music	63	0
28. Novelty and Accessory Making	83	0
29. Novelty and Interior Decoration	32	0
30. Nursery Education	216	2
31. Painting and Decorating	55	0
32. Pattern Making	75	0
33. Plumbing and Sheet Metal	1094	2
34. Printing	2624	10
35. Radio Mechanics	760	0
36. Salesmanship	273	1
37. Shoemaking	141	0
38. Sign and Show Card Writing	197	2
39. Stone Carving and Sculpture	10	0
40. Upholstery	18	0
41. Woodworking	1244	2

There were no orthopedic enrollments in 41 of the 84 courses being offered on June 1, 1939.

An inspection of the answers of the school principals given in reply to the question requesting them to extend their remarks to anything pertinent to providing orthopedically handicapped persons with vocational or trade training, shows that they recommended the provision of instruction to orthopedically handicapped persons in 31 of the 41 courses in which there were no orthopedic enrollments. The offering of such instruction would be dependent upon the extent of orthopedic disability in relation to the physical requirements of the trade or vocation and the possession on the part of the individual of the necessary qualifications other than physical.

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The eight trades and vocations for which there were no specific recommendations by the principals of the schools are:

Commercial	Men's Clothing Manufacturing
Dental Assistants	Music
Foundry Trades	Painting and Decorating
Marine Occupations	Pattern Making

Reliable studies made and published regarding the occupations in which orthopedically handicapped persons have been engaged successfully show them as occupying positions not only in each of these fields of endeavor but in all 84.

To Summarize: of eighty-four (84) courses being offered in 22 of the 23 vocational schools of the City; forty-three (43) actually include enrollments of orthopedically handicapped students; thirty-one (31) of the forty-one courses in which there were no orthopedic enrollments are considered by the school principals to be suitable for such persons; reliable studies show that orthopedically handicapped persons have been and are engaged gainfully not only in the vocations taught in the remaining eight (8) but in all of the eighty-four (84) courses.

It may be concluded then that each of the eighty-four courses now being offered in the vocational schools of the City is suitable for one or more types of orthopedically handicapped persons dependent upon the nature and extent of the disability of the individual and upon the possession on the part of the individual of the necessary qualifications other than physical.

The findings of the Crippled Children's Division of the Department of Health, reveal a potential case load of approximately 6,290* orthopedically handicapped youths between the ages of 14 and 20 inclusive, who, so far as their physical state is concerned, probably are capable of enrollment and pursuit of the courses in the existing vocational schools without any special facilities being provided for them except elevator service and street level entrances or ramps. Furthermore, if the latter are not provided, there remain at least 6,200 (minimum estimate, 14-20 year age group, group I,

* Minimum estimate, groups I and II, Table I, p. 20.

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Table I) pupils who could be enrolled in the vocational high schools. As stated before, such enrollment as of June 1, 1939 was 111 children with orthopedic defects. As in the case of the physically normal, a number of the 6,290 pupils would not possess the aptitudes or qualifications other than physical, necessary for a successful pursuit of the particular courses of their vocational interests.

Of the approximately 9,300** orthopedically handicapped youths between the ages of 14 and 20 inclusive, there remains from 2,000 to 2,800 (estimate, group III, Table I) for whom special facilities, care and treatment appear necessary if they are to be given the opportunity for complete or partial industrial and social adjustment. Some, due to their physical state, or due to poor mental equipment or for other reasons, will never attain such adjustment. In this connection, however, the determination of the fact that an individual is not susceptible to partial or complete adjustment should be made only after the most serious consideration and exploration of his assets and liabilities through actual or simulated performance of vocational tasks. A decision so serious to the life of an individual should be made only after extended trial rather than through mere evaluation and interpretation of formal mental aptitude, ability and adjustment tests.

Others will be found who are capable only of a partial adjustment into normal industrial and commercial life. These will be capable of adjustment to commercial or industrial work only under sheltered conditions in their homes or in special facilities such as sheltered workshops.

Finally, among this last group, there will be found those who after intensive and extended medical, surgical, educational, social or recreational treatment will be able to take their places in normal life beside their able-bodied contemporaries.

The three groups just described are not static. An individual through treatment may progress from one thought hopeless to one susceptible of full rehabilitation. The "will to do," so outstanding

** "Estimated number of Crippled Children in 14-20 year age group," Table I, p. 20.

in many of the physically handicapped, carries them over many obstacles that are too often assumed to be impossible of accomplishment. Then again, the advances being made in medical and surgical treatment will undoubtedly continue to go a long way in alleviating and overcoming the consequences of physical handicaps.

It is thought that existing public and private institutions serving the metropolitan area, can provide, with some readjustment of facilities and policies, the means for the complete or partial industrial and social adjustment of those among the group needing special facilities, and for the care and treatment of others in this group who are not so susceptible of such adjustment. These institutions, including certain hospitals, convalescent homes, sheltered workshops, industrial and occupational services for the handicapped homebound, vocational and occupational training agencies for the crippled, and similar readjustment activities which maintain actual operating facilities as distinguished from advisory and counseling services alone.

With this in mind it appears desirable that the school authorities call a conference of the representatives of each of these institutions to take inventory of the facilities and programs existing in them. This should include programs for vocational adjustment and the care and treatment of the orthopedically handicapped of the types needing special facilities. Ways should be developed of integrating their efforts and coordinating them with the school system.

It is impossible to say that each one of the 2,000 to 2,800 orthopedic children (group III, table I, p. . . .) will remain in his present group, and that 6,290 will remain in the other group. Upon individual evaluation or after treatment some children in the group needing special facilities will be found who belong to and have need only of the treatment of the type represented by the first two groups, and vice versa. Cognizance should be taken of this fact and means provided of easy transfer or flow of individuals from one group to the other as circumstances indicate.

Summarizing, if the recommendations of the conference should result in a program for the group represented by the 2,000 to 2,800, then a solution to the whole problem would be accomplished by:

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- (1) The Board of Education providing vocational facilities for those of the type represented by the group of 6,290; and
- (2) The special agencies and institutions providing the facilities and program for those of the type represented by the group of 2,000 to 2,800.

The responses to the queries sent to the principals of the vocational schools indicate that some of them are concerned about the difficulty of placement of orthopedically handicapped students after successful pursuit of the courses in their schools. There is difficulty in this regard, but it can only be overcome by the education of prospective employers as to the abilities possessed by this group of individuals. The vocational schools can do much toward the solution of this problem through affording orthopedically handicapped youth the opportunity to pursue their courses in full competition with the able-bodied. The experience of those engaged in the field of the rehabilitation of the orthopedically handicapped indicates that if permitted so to compete the handicapped youth will give excellent account of themselves. The vocational schools, being the ante-rooms or corridors to industry, should lead the way. Anticipated difficulty of placement should not stand in the way of affording handicapped youth the opportunity to prove themselves.

If emphasis is placed primarily upon a high percentage of placements in judging the efficiency of a principal and the staff of a vocational school, then they have no alternative but to be selective and cautious in the matter of those they admit. Such an emphasis will react to the detriment of orthopedically handicapped youth in many cases, for their impairments are visible. Even though the individual may possess excellent mental equipment and all of the other equally important qualifications which lead to success in life, the sight of the disability raises the question as to whether he can succeed. The orthopedic youth will have to face this always with prospective employers. They should be given the chance to perform even though they might in some instances fail. Not all of the able-bodied succeed.

As has been stated before, the responses of the principals to the

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queries sent to them indicated a desire to meet the vocational problems of the orthopedically handicapped and to give understanding treatment to them. If principals are to meet the challenge it should be made clear that their efficiency and that of their staffs so far as orthopedically handicapped students are concerned is to be judged not solely or to a large extent by success in placement or mass graduation, but largely by the growth in the vocational skills of the individuals even though some of them fail of placement.

As to the concern of the principals regarding placement and the various occupations which have been successfully pursued by handicapped persons, the Institute for the Crippled and Disabled of New York City pioneered in the matter of placement of the orthopedically handicapped in the metropolitan area. It established a placement service in April 1917 which it operated within its organization until 1927. In the latter year a study was made by the Russell Sage Foundation of the placement agencies serving the various types of physically handicapped. This resulted in the establishment of the Employment Center for the Handicapped. In 1934 the activity was undertaken by the New York State Employment Service. A study of the placement records and job histories of the above organizations was made by Anderson* in 1932, who analyzed 4,404 case histories of orthopedically disabled men.

The various types of orthopedic disabilities served by the placement activity involved 97 classifications including nearly every possible type and combination and degree of orthopedic disabilities.

These classifications for orthopedic disabilities, show the wide range in the extent and nature of disability covered in the categorical term "orthopedically handicapped." The classification of the physical capacity of any disabled individual to perform the industrial operations of any trade or vocation is not an indication of the residual degree of physical abilities. The usual classification in the terms of "good use," "partial use," "lame," and "stiff," are generally descriptive, but they fail to define the extent of the use remaining in the affected body members with sufficient accuracy

* Anderson, Dr. Roy N., *The Disabled Man and His Vocational Adjustment*, Institute for Crippled and Disabled, New York, N. Y., 1932.

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to enable one to determine from the classification alone, whether a disabled person can perform the physical operations required by a particular trade or vocation. That can be done only by testing the remaining physical capacity of any affected body member through actual or simulated performance of the industrial operations involved in the particular trade or vocation.

With the totally blind and the deaf mutes there is a definite degree and type of physical industrial disability. With the cardiac, the hard of hearing, and the pulmonary tuberculous there are varying degrees and types of physical industrial disability. With the orthopedically handicapped there are varying degrees of a multiplicity of individual industrial disabilities, hardly any two of which are identical in type or degree. Individually and as a group, the blind are very considerably limited in the scope of trades and vocations they may undertake successfully. Individually, the orthopedically handicapped range from being totally barred from the pursuit of any trade or vocation whatever, to being limited only to a minor degree in that regard. As a group, they are found in the whole range of human occupations competing successfully with the physically normal.

The difficulty in establishing any comprehensive and complete system of classifications of orthopedic disabilities from the industrial viewpoint and the varying degrees and multiplicity of individual industrial disabilities ranging from slight to total industrial impairment, make it imperative to give proper educational and vocational guidance to the orthopedically handicapped on a highly individualized basis after a thorough medical and physical examination and evaluation with attendant muscle and physical achievement tests. The medical examination should be a complete one and not confined solely to the orthopedic condition because there may exist other latent conditions which, when they become acute, may require a change in vocation or trade. Changing of vocations in the case of the orthopedically handicapped is frequently accomplished only with difficulty.

In the Special Report, "Vocational High Schools Trends and Forecasts," submitted as a part of the Thirty-Ninth Annual Report of the Superintendent of Schools of the City of New York, Frank-

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lin J. Keeler, Principal, Metropolitan Vocational High School, states:

"As teachers of subjects, the men and women in a school of any size meet too many different boys and girls within too short a time to be able to take any continuous interest in or responsibility for all of them. This is also true of the one or two or even half dozen counselors who may be assigned to the task. Moreover, if there are several counselors, it is desirable that each person specialize in some one phase of guidance. Nevertheless, it is essential to the success of any guidance program, in fact, of any educational program, that each pupil be the continued responsibility of someone. This is accomplished by having each teacher act in the capacity of adviser, actually in loco parentis. Immediately upon admission to the school the pupil is assigned to the advisor and is responsible to him for the entire length of stay in school. Under normal conditions the advisor would receive one new pupil each month and would have daily contact with him for four years. It is the advisor who is responsible for seeing that all the services of the school, curricular, extra-curricular, guidance, personal, are brought to bear upon each pupil in his section. He provides continuity and inevitability of service. Advisors of full-time pupils are programmed for one full period a week for counseling; advisors of part-time pupils for five periods."

It is not known whether this practice in the Metropolitan Vocational High School is followed by all of the other schools of the City. It seems a most practical approach to the solution of the problems of the orthopedically handicapped undertaking industrial education. Particularly is this so because the advisors are taken from the teaching staff who are craftsmen and skilled industrial workers in daily contact with physically normal students. Such contact insures a normal approach to the solution of the problems of the orthopedically handicapped. The teacher who is in daily contact with the physically normal is not apt to attribute to the physically handicapped per se, emotional or other difficulties which are found equally among the physically normal.

In the vocational schools teachers should be designated as advisers for the orthopedically handicapped students. These advisers

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should be responsible for seeing that all of the services of the school, curricular, extra-curricular, guidance and personal, are brought to bear upon each orthopedically handicapped student assigned to them and that continuity of service is provided. The advisers should follow the progress, and adjustment of their students; receive, analyze and interpret reports of progress rendered by the teachers and instructors of the various activities, curricular and extra-curricular, undertaken by the students; discuss lack of satisfactory progress in any regard with the teachers and the pupil. Where there seems to be need of medical, social or other service not provided in the school, the advisers should arrange for and make referral to an appropriate agency that will provide the needed service, and they should establish the contact between the school and the home.

In a city the size of New York with its many varied and specialized industries and classifications of professional, sub-professional, skilled, semi-skilled and unskilled jobs, it is difficult for a boy or girl reaching vocational age to have knowledge of the many fields of human effort in which men and women are gainfully employed. Their knowledge in this regard is generally limited to the vocations they see in the particular section of the city in which they reside, to the vocations their parents or friends follow or what they might have observed in daily life. Some means should be devised to give a better understanding of the vocations followed by women and men in the city so that a wider choice may be open to them from which to express their interest and desires; some means should be devised to give them this education.

Of particular importance in the vocational guidance of the orthopedically handicapped is the medical examination. Included in the report of the medical examination should be a statement of the limitations as to what types of work may not be undertaken by the individual; the limitations as to recreation and athletics; particular physical education or physical therapy which might be beneficial and any limitations as to pursuit of the regular physical education program of the vocational high schools. The findings of the physician on the medical examination and his recommendations should be carefully considered in planning the vocational training.

CHILDREN WITH CEREBRAL PALSY

INTRODUCTION

Most cities in this country, including New York City, have failed to recognize the educational problems associated with children afflicted with cerebral palsy. In some cities the problem of providing care and education for children with cerebral palsy is equal to or greater than the problem arising from infantile paralysis. In the country as a whole the problem of cerebral palsy is half as great as the problem of infantile paralysis, in the number of children affected. The treatment of both conditions is prolonged and expensive, frequently extending over a period of years.

In a number of cities selected groups of children with cerebral palsy are receiving intensive treatment concurrently with academic education. In New York City neither the Department of Hospitals nor the Board of Education have established any special facilities for the treatment or education of children with cerebral palsy. Similarly the existing facilities for the treatment and training of such children in private institutions within the city are limited. However, the private orthopedic hospitals of New York City recognizing the need for the establishment of facilities for the care of these children have recently become more interested in them and are making scientific investigations of the problem. The problem itself, as regarding the provision of facilities abreast of current knowledge of the treatment of cerebral palsy, is not insurmountable. As it is a constant problem which bears a direct relation to the birth rate and is not subject to epidemiological fluctuations, it lends itself readily to practical solution on the basis of current knowledge.

The inadequacies of treatment and educational facilities arise from the nature of the disability, the prolonged treatment time required, and an understandable failure to utilize the modern knowledge of therapy which has not yet had time to permeate through the medical and educational bodies—which in turn, is due in part

to the relative inflexibility of medical and educational administration.

At the present time many of the children with cerebral palsy who are accepted by the schools are assigned to classes for the orthopedically handicapped, but the Board of Education is doing nothing toward their physical rehabilitation and few if any special educational techniques are employed. The more severe cases are almost totally neglected with the exception of those who are receiving some instruction by visiting teachers in their homes. Although it is recognized that the more severely handicapped cerebral palsy children require special educational techniques by specially trained teachers, no effort has been made to meet this need, nor to correlate what little instruction they do receive with the muscle re-education and training programs for such of these children as are receiving treatment. It must be admitted, however, that such muscle re-education and training programs for cerebral palsy children in general, and for those confined to their homes, are largely non-existent. An attempt has been made by private organizations to meet this need for home care. It, too, is admittedly inadequate.

In recognition of the existing situation the Committee has made a study of the most advanced work that is being done for children with cerebral palsy. Its members have visited schools and hospitals specializing in this work and upon the basis of their observations and conferences with authorities in this field, this section of the report is submitted together with recommendations for the care of children with cerebral palsy in New York City.

In view of the little that is known generally about the training of children with cerebral palsy and the little that is available on the subject in literature, the Committee feels justified in devoting in its report what would otherwise be an undue amount of attention to this subject.

It is the opinion of the Committee that while the problem of rehabilitating children with cerebral palsy is pressing it is even more important that the medical profession give greater attention to studying the causes, means for prevention, and treatment of the condition.

The Problem

Cerebral palsy ranks second only to poliomyelitis as the greatest individual cause of crippling in New York City. Cerebral palsy has, until recent years, been the most neglected field of the crippled child. The chief reason for this has been the apparent hopelessness of the condition in respect to the attainment of satisfactory results. The general appearance of the cerebral palsied individual is often not prepossessing, and there has been in the past less interest, and less success in treatment has been attained with this group of children than with any of the other various types of crippled children.

Surveys have been made in various parts of the country, both in urban and rural areas, which have shown that the problem is really a large one with regard to the number of cases. They have shown that there are approximately seven cerebral palsy cases born each year per 100,000 population. Not more than two of these seven children have birth injuries and so are likely to be truly mentally deficient, and perhaps not more than one of the seven will die before attaining adult life. It is apparent, therefore, that under twelve years of age there would be living about 72 such children per 100,000 population, allowing for the probable death rate. In considering the large number of villages and small cities that are scattered throughout the country, 72 children of this type in communities even as small as 100,000 population is a real problem. Not more than 30 per cent of these will be truly feeble-minded, which means that approximately 50 of the 72 are treatable from a mental standpoint. Some of these will be rather mild cases, and others will be extremely severe, but fully 75 per cent will be of moderate or mild degree of severity and will constitute a thoroughly treatable group. In a city of a million population there will be easily 350 treatable children, and in a city the size of New York, there are probably at least 2,500 children who can benefit from treatment.

The Crippled Children's Division of The Department of Health of New York City reports that there are known to that Division 1,845 children under 21 years of age with cerebral palsy, exclusive of children who are mentally deficient, and that about 15% of all

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crippled children in New York City are crippled as a result of cerebral palsy. An analysis has been made of these known cases showing:

1. the age distribution.
2. the color and sex distribution.
3. the geographical distribution.
4. the part of the body involved.
5. the estimated extent of physical involvement and degrees of severity of involvement.

TABLE VIII

AGE DISTRIBUTION OF CEREBRAL PALSY CHILDREN REGISTERED
WITH CRIPPLED CHILDREN'S DIVISION, DEPARTMENT OF HEALTH,
JUNE 30, 1940.

		<i>Cerebral Palsy Children on Register</i>	
<i>Age</i>	<i>Number</i>	<i>Per cent of Total whose ages are known</i>	
0	17	.93	
1	40	2.20	
2	59	3.24	
3	84	4.61	
4	97	5.33	10.98
5	82	4.50	
6	104	5.71	
7	93	5.11	
8	120	6.59	
9	125	6.86	
10	125	6.86	
11	111	6.10	
12	117	6.43	
13	106	5.82	
14	95	5.22	
15			64.53
	117	6.43	
16	103	5.66	
17	83	4.56	
18	64	3.51	
19	79	4.34	
20			24.50
	446		
Unknown	24	...	
Total	1845		

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TABLE IX

COLOR AND SEX DISTRIBUTION OF CEREBRAL PALSY CHILDREN REGISTERED WITH CRIPPLED CHILDREN'S DIVISION, DEPARTMENT OF HEALTH, JUNE 30, 1940.

<i>Color</i>	<i>Number</i>	<i>Per cent of Total White & Negro</i>
White	1612	94.9
Negro	86	5.1
Other and Unknown	147	...
<hr/>		<hr/>
Total	1845	100.0

<i>Sex</i>	<i>Number</i>	<i>Per cent</i>
Male	1053	57.1
Female	792	42.9
<hr/>		<hr/>
Total	1845	100.0

TABLE X

CEREBRAL PALSY CHILDREN REGISTERED WITH CRIPPLED CHILDREN'S DIVISION, DEPARTMENT OF HEALTH, BY HEALTH DISTRICTS, JUNE 30, 1940

<i>Health District</i>	<i>Cerebral Palsy Children on Register</i>	<i>Health District</i>	<i>Cerebral Palsy Children on Register</i>
New York City	1845	Brooklyn	704
Manhattan	434	Bay Ridge	74
Central Harlem	41	Bedford	76
East Harlem	49	Brownsville	89
Kips Bay	49	Bushwick	64
Lower East Side	85	Flatbush	94
Lower West Side	80	Fort Greene	49
Riverside	57	Gravesend	89
Washington Heights	73	Red Hook	55
The Bronx	380	Sunset Park	54
Fordham	51	Williamsburg	60
Morrisania	84	Queens	287
Mott Haven	56	Astoria	62
Pelham Bay	39	Corona	41
Tremont	83	Flushing	36
Westchester	67	Jamaica East	53
		Jamaica West	57
		Maspeth	38
		Richmond	40

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TABLE XI

PART OF BODY INVOLVED, CEREBRAL PALSY CHILDREN REGISTERED WITH CRIPPLED CHILDREN'S DIVISION, DEPARTMENT OF HEALTH, JUNE 30, 1940.

<i>Part of Body</i>	<i>Children</i>	
	<i>Number</i>	<i>Per cent of Total Known</i>
Two legs	465	25.9
One arm and one leg	435	24.2
Whole body	261	14.5
Two arms and two legs	245	13.6
One leg	146	8.1
One side	141	7.9
One arm	48	2.7
One arm and two legs	43	2.4
Two arms	9	.5
Two arms and one leg	2	.1
Unknown	50	
Total	1845	
Arm, or arms, with or without other part of body....	1184	66.0
Leg, or legs, with or without other part of body....	1795	96.8

The estimated extent of physical involvement:

Quadriplegia	57%	Legs only	4%
Triplegia	8%	One leg or one arm.....	2%
Hemiplegia	22%		

The estimated degree of severity of involvement in terms of walking ability or use of arms:

Severe	28%	Mild	27%
Moderate	44%		

Description of Types of Cerebral Palsy

Motor Types—The various ways in which muscles can act wrongly are easily described. There is the type of paralysis where it is impossible for the child to move the muscle at will. This type of paralysis is very seldom seen in cerebral palsy. The opposite of this condition, however, when muscles involuntarily move joints, whether the child wills it or not, is a frequent disturbance in cerebral palsy.

Athetosis

The first difficulty to be considered is that of involuntary motion. This is called, for brevity, athetosis, and represents about

40% of all cases of cerebral palsy. The arms or legs, or face move involuntarily. The presence of these involuntary motions upsets the child's attempts to make normal motions. Many children have been wrongly classified as defective because of the presence of involuntary motion in the face, resulting in grimaces, and drooling. When the involuntary motion occurs in the arms the results, as far as the child is concerned, are similar to the effect of attempting to write in a moving train or automobile. When it is present in the legs there is difficulty in walking correctly and usually some difficulty with balancing because of the motions which occur and which tend to disturb normal balance. In many instances the patient attempts to control involuntary motion by holding himself very tense. This tension frequently becomes so that it is almost impossible for the individual to relax. Athetosis is an overflow reaction of the muscles upon attempted voluntary motion, causing the child to exhibit rhythmic movements of the limbs and grimaces resembling caricatures of normal facial expression. The emotions exert a profound influence in enabling the athetoid to gain control over the muscles. Excitement and unpleasant emotional reactions aggravate the spasm, while agreeable environment enables the patient to gain almost perfect control of bodily movements.

There is not a true paralysis in the ordinary sense of the word as meaning loss of motion or sensation. Instead, there is an exaggerated motion and often the musculature is surprisingly good, so good, in fact, that certain groups of muscles become stronger than opposing ones, resulting in rigidity and various forms of contracture, especially when treatment is not begun at an early age.

Spasticity

A second type of muscle or motor difficulty is spasticity. The true spastic also represents about 40% of the cerebral palsy cases. The true spastic has extreme stiffness in the muscles whenever he attempts to move them. Movement is slow and laborious, but the spastic is able eventually to accomplish the motion and with a considerable degree of accuracy. It is easy to confuse the athetoids and the spastics especially if the athetoid, has adopted the habit

of tensing the muscles. This attempt to hold still is not a universal habit of the athetoid, but is present in about half of the cases. The spastic, on the other hand, is always still whenever he attempts to make a motion, although this stiffness may disappear almost completely when sitting still. By observing these two types closely and over a period of time, a very definite difference, between them can be observed. It is important to make the proper diagnosis in connection with the various teaching problems which will be considered later. In the spastic also, especially in the type where one part of the body is involved, there is often decreased sensation; thus an arm which may have fundamentally fairly good function may be used very little because of the fact that when grasping or holding objects they are not felt at all clearly. The actual sensation may be likened to that of attempting to use the hand with a heavy woolen glove. This lack of sensation will produce a definite effect on the use of the arm in a variety of activities. It is not so apparent in the use of the legs, since finer degrees of sensation are not so necessary in the act of walking.

In spastic conditions, the limb moves as a solid piece, and the hand, in attempts to grasp an object, may retain a fixed position and is relaxed with difficulty. In the early years the child cannot walk alone or even when aided, because of the rigidity of the lower extremities. As age increases the spastic may learn to walk after a fashion. The gait is quite characteristic, the toes scrape along the floor, the heels are not brought down and the spasm of the thigh muscles forces the legs to cross each other producing a scissors gait, and the knees are frequently held flexed. Speech is usually difficult and frequently there is profuse salivation with drooling.

Ataxia

The third group of cases in cerebral palsy are the ataxics which comprise about 20% of all cerebral palsy cases. Ataxia is a lack of balanced action between opposing muscle groups, resulting in clumsiness of movement, slurring of speech, tremor, and the gait is rolling or staggering, like that of a drunken man. These children have a different part of the brain involved, usually, but not always, the cerebellum. They do not have involuntary motion, nor

are the muscles stiff but they do have severe disturbance of the balance and there are frequently associated with this, motions of the eyes which are not under control, and these tend to cause dizziness or discomfort from long attempts to fix them upon the printed page, or other objects. These children have difficulty in sitting erect, and in the accurate use of the legs in walking, and in the use of the eyes for reading or writing or other close work.

These three conditions, athetosis, spasticity and ataxia are the three main types seen in cerebral palsy. They must be carefully differentiated, in order to set up proper training methods for each. There are other types of cerebral palsy but most of these are seen infrequently and can for practical purposes be considered as involuntary motions or tremor athetosis.

The Causes of Cerebral Palsy

Hemorrhage in the brain at birth is the most common cause of cerebral palsy. It is known to have occurred in normal delivery, in Caesarean birth, and in precipitate delivery, as well as in labor accompanied by the use of instruments.

A faulty embryonic development, such as failure of part of the brain, even though present, to attain its proper growth, may cause cerebral palsy. Just as a child may be born with a short femur or absent fibula so he may be born with a brain defect. The amount of disability will depend upon the extent and the location of the brain defect. Should it be restricted to a single brain area primarily concerned with muscular activity, the child may suffer no greater mental consequences than the child with a hemivertebra.

Infections, toxic factors, and hereditary types of degenerative diseases may also produce cerebral palsy. Hemorrhage resulting from toxic factors, such as may accompany severe jaundice lasting for several months after the birth of the infant, may cause cerebral palsy.

Damage to the brain occurring either before, during or after the delivery of the infant may incapacitate the child for life. The inability to control muscular movements may cause a child to appear

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mentally defective, who in reality may be mentally bright. Such cases are often referred to as infantile cerebral palsy.

Physiological Considerations

Cerebral palsy, or cerebral spastic paralysis, actually represents a group of conditions rather than a single entity. These conditions are grouped under one heading because of the fact that the difficulties arise from within the cranial cavity. In this way they differ from infantile paralysis, for example, which is a condition arising from a disease of the spinal cord.

If the cerebral palsied child is given the opportunity to develop the unimpaired areas of the brain, the possibilities of becoming useful to society are as great as those of a child whose physical handicap is not related to a brain injury. Education has done much for the blind, the deaf, and the dumb. These people are capable of average normal education and can become socially useful if guided into activities suitable to their abilities and where their handicap will not prevent their doing satisfactory work. Education plays at least as important a role in training the cerebral palsied person. Here, however, the tendency is to overrate the handicap and to undervalue the therapeutic possibilities based on residual abilities. The grimaces and drooling commonly seen in those patients have not infrequently led to their being mistaken for idiots or considered feeble-minded, whereas such a condition should no more be a criterion of mental defect than is a disturbance limited to leg or foot.

The brain is such a complex organ and there are so many functions involved that the physical condition resulting from injury or disease of one part of the brain will bear little or no resemblance at all to injury or disease to some other part of the brain. In a broad sense it may be stated that the chief functions of the brain are first, the reception of incoming stimuli such as those resulting from sight, hearing, the sense of touch, smell and taste; and second, the actual thinking parts of the brain, which receive the stimuli which come in and the motor areas of the brain which deal with the function of the various parts of the body in control of the arms, legs, and speech.

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It is essential to determine whether the disease is progressive and what degree of mentality is present. Evidence that the disease rapidly is progressive places the case beyond the reach of effective training; a profound degree of mental defectiveness excludes the case because there is insufficient undamaged residue with which to work.

Cerebral palsied children do not develop concentration and selective ability as naturally as the normal; the wires remain crossed and involuntary movements continue. Training is, therefore, even more important for the cerebral palsied than the normal child; by education it is possible to develop unaffected centers of the brain, and a corresponding improvement of the damaged controls can be affected. The importance of concentration is evident in the ability of the cerebral palsied child to make a normal coordinated movement when they forget themselves in work.

There are those who typewrite though they cannot feed themselves. They guide the movements of their hands with their eyes in typing, which is not possible in eating. Learning to eat in front of a mirror helps to correlate vision with the muscular act. Using eye shields with pin point holes for the child to see through helps to limit the vision to the task at hand. The athetoids especially, will relax better if attention is directed to thoughts which prevailed when they were relaxed instead of calling attention to their efforts. They must avoid being muscle conscious as all of us must avoid conscious breathing if we do not wish to upset the rhythm of respiration. The counterpart of this is seen in normal persons acquiring a skilled act. Until they become adept, they work with exaggerated tension and the element of self-consciousness will interfere with the performance.

To become adept in learning to play the piano or violin or to swim, regardless of whether the person is normal or physically handicapped, it is necessary that motor centers be adapted to these specific exercises, by gradually and progressively coordinating impulses with muscular contractions until more and more harmonious relation is developed between conscious perception and volition. In other words, capacity for skilled and accustomed muscular move-

ments depends upon memory of them, and the power of recalling them and evoking them again.

The sight and hearing problems are only problems of the teachers in that teachers must be aware of their existence and of the degree of severity which they represent; eye examination in one of these children may reveal only a slight visual defect, however, combined with a severe incoordination of the arms, the defects are tremendously magnified in the total disability of the child. Were the eyes perfectly normal, the arms could be trained more easily, but with even a slight difficulty in sight, the difficulty in training the arms is increased.

Hearing defects are also important, especially considering the type of hearing, whether it is evenly distributed throughout the whole auditory band, or a limited hearing loss of one or another band of the audible sounds. Hearing difficulties are present in about 15 per cent of cases in sufficient degree to interfere with speech development and education. They are not deaf mute or spastic. Just as a color-blind person is blind to one end of the spectrum, others may be deaf to one end of the tonal scale.

Care must be exercised in differentiating between a special disability and a deficiency. The latter is not amenable to treatment, whereas a special disability, such as reading and writing can usually be overcome, or substituted for by proper training. The child who is good in arithmetic but poor in reading, or the reverse, suffers from a special disability.

Unless there has been an injury to the brain so gross as to cause idiocy, the child with cerebral palsy may be considered essentially as an individual who has little or no voluntary control over his reflexes. As the injury to the brain is generally a diffuse one, there is seldom encountered a pure type of muscular disorder. Nearly any conceivable type of motor disturbance or combination of motor disabilities may occur. There is a large amount of nervous energy spent in attempts to move a single muscle group and often the mere thought of moving a finger is sufficient to throw the entire body musculature into a chaos of writhing movements. As long as the factors of fear, self-consciousness and anxiety are in abeyance, the patient has little or no difficulty in making a normal coor-

dinated movement. He must avoid too many sensory stimuli to which his nervous system has not yet been accustomed. Babies at birth are without physical and mental control. Their movements are uncoordinated and more or less at random. At birth the brain is unable to function properly, to select the relevant impulses from among the sensory impressions which bombard the nervous system and to translate them into purposeful action. Until this selective capacity develops with growth, babies grimace, drool and wiggle quite unconsciously. They are unable to focus attention upon any one object, and will pick up a toy only to reject it for another the following moment. Motions are without purpose. As intelligence develops, concentration on a purpose is achieved, aimless movements and reactions cease. Thinking actually develops the structure of the brain; certain structural elements in the brain grow as use is made of them. This is particularly true of the substance which insulates the nerve fibers. The insulating material is least in amount at birth, when muscular control is at its minimum. It increases noticeably at the end of the first year at the time when speech and walking occur. It shows marked additions in adolescence as more connections are made between nerve fibers to facilitate the ability to classify knowledge to which there has been exposure in childhood. Before this insulation is built up, the nervous system is like a switchboard with crossed wires, and impulses often bring wrong muscles into action. In the damaged area of the brain of a child with cerebral palsy this normal anatomical development may not occur.

Preliminary Examinations

Before children are accepted for treatment and education, a very thorough examination should be made to determine the severity of the brain damage, the degree of the intellectual impairment, the type of muscular disturbance, whether there is a progressive disorder, and the degree of improvement that can be reasonably expected. This calls for not only careful clinical examination but also careful analysis as to the intelligence rating, special disabilities in speech, hearing, vision, reading, and writing, which are important for the intellectual and educational training. The majority of speech disturbances concern expressional speech which is part of the gen-

eral motor disability. The problem associated with left-handedness and other aspects of cerebral dominance make the situation in education and psychometric examination more difficult. The study of these special disabilities may be of great help in outlining a general school program. Careful psychiatric and sociologic investigation is important.

Fundamentals of a Teaching Program and Multiple Defects

The following classification must be made for the study of cerebral palsy in preparation for a teaching program.

1. Type of difficulty
 - A. Athetosis (Involuntary motion, including tremors)
 - B. Spasticity
 - C. Ataxia (and other primary incoordination)
2. Part of body involved
 - A. Legs
 - B. Arms
 - C. Speech and face
3. Sensory disturbance
 - A. Sight
 - B. Hearing

Sensations

 1. Superficial
 2. Deep

When a single part of the body, as the foot or arm is affected, it is called a monoplegia. Hemiplegia refers to a paralysis of one side of the body. Quadraplegia is a paralysis of all four limbs. The extent of the paralysis bears no relation to the degree of mental deterioration. There may be extensive paralysis and no mental defect or slight paralysis with extensive mental involvement.

The part of the body involved, whether legs, arms, or speech has varying effects on the teaching program. If the legs are involved there will be a necessity for transportation and this must be considered in connection with the ability to get to and from the school

and around the school while present. The involvement of the arms is primarily important in connection with the ability to write and turn pages. It is also of importance in placement in the school with regard to self-help in such matters as dressing or undressing, wheeling a wheel chair, and the use of the toilet. The involvement of speech or face has a primarily important position with regard to the use of speech, but the involvement of the face may be of some importance in connection with the placement of the child in school because of his conspicuous appearance and its effect on other pupils.

The eye defects which are serious can probably be best solved by following the methods used for sight conservation. These methods should be incorporated into the regular teaching plan in various proportions depending upon the degree of eye defect. In some instances these defects can be greatly helped by glasses.

When there is difficulty with hearing, the use of a hearing aid is found to be of great value. It is not of special help to the child at first in the ordinary hearing of speech because the child must become accustomed to the new sounds with which he is not familiar, and may therefore apparently derive little or no help during the first few months. However, the child can be taught that these additional sounds heard by the use of a hearing aid are needed to make him understood by other people. The chief function of the hearing aid during the first few months for hard of hearing children will be in connection with speech training rather than as an actual aid to hearing. This is an important point, since in some schools there are aids attached to each desk for the children in the hard of hearing group. These hearing aids are of much less apparent effect in the athetoid child and this must be kept in mind when apparent failure of the apparatus has been found when the child first uses it.

Lack of sensation in the arms must be borne in mind as a possible condition in the spastic child when attempting to manipulate various types of materials in school activities, especially in manual training and other active types of use. This sensory change is not found in the athetoids or the ataxics but only in the 40 per cent representing the true spastics.

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Each of these difficulties has been considered separately up to this point, but there are practically no cerebral palsies in whom a single difficulty is found. It is the combination of difficulties which must be considered as they affect the teaching program. Thus, a simple difficulty with sight would be treatable by the use of methods used in teaching children with visual defects. A simple difficulty with hearing, even though it is in the athetoid type, could best be handled in a program for the hard of hearing with a special knowledge of this particular type of defect. However, it is the combination of these defects which must be considered in greater detail.

Extent of Involvement and Related Difficulties

The following chart showing the combinations of involvement to be found in the three main types of cerebral palsy is presented as a basis for further discussions.

<i>Athetosis</i>	<i>Spasticity</i>	<i>Ataxia</i>
1. Legs—Arms	Legs—Arms	Legs—Arms
2. Legs—Speech	Legs—Speech	Legs—Speech
3. Arms—Speech	Arms—Speech	Arms—Speech
4. Legs—Sight	Legs—Sight	Legs—Sight
5. Legs—Hearing		
6.	Legs—Sensation	
7. Arms—Sight	Arms—Sight	Arms—Sight
8. Arms—Hearing		
9.	Arms—Sensation	
10. Speech—Sight	Speech—Sight	Speech—Sight
11. Speech—Hearing		
12.	Speech—Sensation	
13. Legs—Arms—Sight	Legs—Arms—Sight	Legs—Arms—Sight
14. Legs—Arms—Hearing		
15.	Legs—Arms—Sensation	
16. Legs—Speech—Sight	Legs—Speech—Sight	Legs—Speech—Sight
17. Legs—Speech—Hearing		
18.	Legs—Speech—Sensation	
19. Arms—Speech—Sight	Arms—Speech—Sight	
20. Arms—Speech—Hearing		
21.	Arms—Speech—Sensation	
22. Legs—Arms—Speech—Sight	Legs—Arms—Speech—Sight	Legs—Arms—Speech—Sight
23. Legs—Arms—Speech—Hearing		
24.	Legs—Arms—Speech—Sensation	
25. Legs—Arms—Speech—Sight—Hearing	Legs—Sensation	

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<i>Athetosis</i>	<i>Spasticity</i>	<i>Ataxia</i>
26.	Legs—Arms—Speech— Sight—Sensation	
27. Legs—Sight—Hearing		
28. Arms—Sight—Hearing		
29. Speech—Sight—Hearing		
30.	Legs—Sight—Sensation	
31.	Arms—Sight—Sensation	
32.	Speech—Sight—Sensation	
33. Sight—Hearing		
34.	Sight—Sensation	

It can be seen that these combinations differ in the athetoid, spastic, and ataxic due to the fact that there is seldom any sensory difficulty in the athetoid, any hearing difficulty in the spastic, and seldom any hearing or sensory defect in the ataxic.

All of these combinations do not have to be studied in detail as some of them are self-evident. For example, the spastic, athetoid, or ataxic who has involvement of the legs and arms alone would be taught in much the same way and would present much the same problems that are presented by the child with infantile paralysis with the arms and legs affected. Both arms and both legs may not be affected necessarily and the condition may be in one side of the body only, which would simplify the teaching procedure still further. The second item, that of the legs and speech, also is not particularly complicated since once the child has been seated at his desk in school and the problem of transportation has been worked out, the only difficulty would be the speech defect, which would be treated as a single defect. The third item, namely, that of arms and speech which is found in all three of the conditions, would represent a special problem due to the combination of defects. The child's ability to respond either by verbalization or sign language might be seriously impaired and although the child might know definitely what he wished to express, the ability to accomplish this expression would be doubly limited. It is possible that by some total body movement or even by movement of the legs he would attempt to signify what was expected of him but on the other hand, failure to accomplish the desired result on previous attempts might have so inhibited him that he would fail to make any definite response purely through the conviction in his own mind that he would not make himself understood.

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All responses of any sort must of necessity be motor responses since to respond in any way whatever requires motion of some muscles, even if this is only represented by a smile or movement of the eyes. There is still the necessity of coordinated muscular response to bring about this motion. It is also important to realize that, if a child has developed an entirely satisfactory sign language, the difficulties pursuant to attempting to develop speech are doubled because of the child's feeling that there is no real need for speech, since the sign language is adequate.

These rare types of sign language, however, are not usually developed in the average child, and therefore the combination of handicapped arms and speech is likely to produce a very retarding influence except in the most brilliant children, and in those in whom special pains have been taken to train them in some special type of sign language.

All of the combinations of handicaps listed in the foregoing table will not be considered, but only those in which there is a special necessity for drawing attention to the teaching difficulties associated with combinations of handicaps. In what will be stated concerning these combinations it must be borne in mind that these handicaps may represent severe degrees or, on the other hand, they may represent extremely mild degrees so that they may be missed entirely. In the case of a single handicap these mild degrees are not usually impediments to proper teaching to any great degree. But if they are combined in such a way that each handicap augments the other, the sum of the two handicaps may be greater in resultant difficulty than the actual combination of the two would bring about if each were considered as an entity.

The combination of handicapped legs and sight only offers additional difficulty in regard to locomotion. Once the child has been seated at his desk, the condition resolves itself into the single handicap of sight difficulty which can be treated by the usual methods used in sight-conservation classes. The same may be said to be true of item number 5, the combination of handicapped legs and hearing. Number 6, the combination of handicapped legs and loss of sensation in the legs, is found only in the true spastic. This would constitute a single handicap and would be concerned chiefly

with medical care and only with the matter of locomotion as regards the teaching problem.

Number 7, or the combination of handicapped arms with a sight handicap is an entirely different problem. This is one in which teaching is extremely difficult as it must be carried out almost entirely by auditory methods. If the child can neither read, because of sight handicap, nor write because of sight handicap, nor write because of the involvement of the arms, it is necessary for him to depend almost entirely upon auditory methods and memory in this type of difficulty.

It is necessary to consider the types of school work that will be best done by this particular group. In one instance the combination of sight and hand handicaps was determined by the fact that the child excelled in arithmetic and computation and in the memorizing of auditorily taught poetry and music. Originally, the child had been considered defective but this was questioned because of his extraordinary memory in arithmetical computation especially. The eye handicap had been entirely overlooked because it was of an unusual and bizarre type. This child was unable to move the eyes downward. The ability to move them from side to side was present, but when looking at any object the eyes gradually moved upward to an extreme position so that a sharp and sudden jerking forward of the head was necessary to bring them down again. Naturally as ordinary reading goes down the page, it was impossible for him to move the eyes laterally and downward line by line at the same time. The result was complete inability to read and, because of the arm handicap, complete inability to use a pen, pencil, or crayon satisfactorily. However, when both of these handicaps were thoroughly understood, it was possible by the adoption of careful methods of teaching to bring about satisfactory results. A number of years had elapsed during which he had been taught nothing and the slowness of the start militated against a satisfactory result, but at the present time he is making satisfactory progress and is much interested in what he has learned to do by the special methods which have been worked out for him.

It is not possible here to go into the nature of all of the various methods which have been developed for each of these individual

children, since the problems are too complex and they occur with many combinations of handicaps. However, it can be stated in the case of this particular boy that an arrangement was made whereby the book could be moved upward and the print made very large so that he was able to see better and did not need the direct focus of his eyes. Gradually by this method it was found possible for him to acquire a knowledge of the large letters and subsequently to learn to read. During this time the eye difficulty was under strenuous medical treatment and a gradual improvement was made in the position of the eyes so that he is able to hold them focused for longer periods of time. In cooperation with the teaching this is bringing about most satisfactory results.

The next item, number 8, a combination of arm handicap with a hearing handicap, is a very interesting one since, as the result of the hearing defect, there is usually present a speech defect and the ability to utilize the sign language by use of the arms is somewhat limited. However, this particular combination is not so difficult as would be expected since in the absence of any visual handicap the child may become a good lip-leader, and be able to understand speech quite well. In fact, the hearing defect may be easily overlooked.

It is necessary to bear in mind in this type of case the necessity for the child to use lip reading as an adjunct to his hearing and not to expect answers to questions by the use of the arms since due to their handicap their response may be difficult. This type of defect is only found in the athetoid, but it is frequently seen. There is a special group of athetoids who have this particular combination, but, in many of these the hearing defect has not been suspected, and the peculiarities of the child's behavior have been assumed to be due to the athetosis, or perhaps he has been considered a defective or a behavior problem. These children, however, are usually of an extremely hopeful type when the nature of their handicap is understood and the hearing defect is taken into strict account.

Number 9, or the combination of an arm handicap with the loss of sensation in the arm, is found only in the true spastic. This difficulty is one which requires a great deal of careful work in the

training of eye to hand coordination since it is only by use of the eye that these children are able to manipulate the arm with any degree of ability whatsoever.

Number 10, the speech and sight combination, is rather unusual, especially in the absence of a hearing defect. These cases are rare and, although they have been seen, it is unlikely that many would be encountered. When they do occur they are chiefly the problem of those trained in the treatment of the deaf for speech difficulties and for those working in sight-conservation classes. It is doubtful whether a great deal of progress can be made with them even in the probable presence of normal underlying mentality.

Number 11, the combination of speech and hearing defects, is one which is well known, and which does not need to be discussed here since it is covered in the area devoted to the teaching of the deaf.

In the next groups, the combinations which are seen such as legs-arms-sight, legs-arms-hearing, legs-arms-sensation, and so forth do not need further consideration since the involvement of the legs in these cases adds only the problem of transportation and locomotion. The remainder of the problem arms-sight, arms-hearing, and so forth is unchanged.

The triple combination, however, of arms-speech-sight, for example, is more difficult to solve. The reason for poor results in most instances is that one or another of the three handicaps has been overlooked entirely. The great importance of not overlooking any of the handicaps must be again emphasized, although one of them may be of a very minor degree in itself, it may nevertheless contribute largely to the difficulties of the problem as a whole. In number 19, for example, which is found in all three of the types of cerebral-palsy, the combination of handicapped arms-speech, and sight, there is a great deal of difficulty in evolving a satisfactory teaching program. The methods of response are sharply limited by the lack of ability in arms and speech and the sight limitations add another factor which makes the acquisition of information difficult except through the ears. In this case, the use of auditory methods of teaching must be used entirely.

The next group, that of arms-speech-hearing, which is only found in the athetoid group, is not an unusual combination. Here visual

methods must be used almost exclusively since the sight in these cases is the only unimpaired part of the body as regards the teaching problem.

In the further items where the legs are involved the same situation holds true which was considered above in that there is only added to the other problems that of locomotion. However, item number 27 is of specific interest where there is involvement of the legs, sight and hearing. This combination is difficult because the usual locomotive handicap is increased by the difficulties due to poor sight, which increases the problem of locomotion to a large extent. The hearing defect also present brings further limitation and the difficulties which the child experiences in trying to get from place to place, and in coping with environment in general, and teaching and school environment in particular, are great. However, with proper cooperation these children can be brought to a considerable degree of usefulness by utilizing the indicated methods involving the types of handicap which are present.

Item 29, the combination of speech, sight, and hearing again represents a problem chiefly for those dealing with the deaf and the blind, and is not one in which any usual methods of teaching are applicable.

The final items are the remaining variations which may exist and deductions can be drawn from the foregoing discussion as to the methods which are most suitable in the treatment of these particular combinations.

Psychological Examinations

The question of the value of psychological testing of children with intracranial birth injuries has always been present. After years of experience with these children certain points seem significant. In the first place, the test should never be attempted by an inexperienced psychologist. In the second place, there is no special test which alone is usable in this testing due to the wide variety of birth injury sequelae. All tests possible have been used even to the extreme of time scores on form board tests. A score obtained on any of the performance test batteries would be of little true value

unless the injury had not affected the control of arms, hands, and head. Such scores should not be compared with what is expected of the non-handicapped child, but may be used as a gauge with which to compare future tests on this same child. On language tests, if there is any speech hesitancy or difficulty present it is unfair to penalize the child for it by standardized time limits. Responses in pantomime certainly should be accepted when the child has no capable means of speech. Children who are ingenious in the use of pantomime possibly delay their speech if definite training is not given because of the skill which they have acquired in expressing themselves. In severely handicapped children where there is no speech and little or no controlled movement, testing is most difficult but occasionally it is possible to obtain satisfactory reactions to tests of comprehension and of absurdity by facial expression. A keen sense of humor is not often found in a retarded child. In testing these children it is frequently best to have someone whom the child knows present, as it is difficult for them to relax and to do their best with an examiner with whom they have had little previous contact. Some mothers are helpful in the test situation, but the majority become emotionally upset when the children do not do as well as they feel they should and this uneasiness and possible displeasure is communicated quickly to the child with unfortunate results. When children cannot sit without support, they feel more secure in this person's lap than when tied in a chair which may not be entirely comfortable. The technique to be used must depend on the skill and experience of the examining psychologist.

The third problem is what to report on the handicapped child. Here again the experience of the examiner is most necessary. Intelligence quotients, especially those which are at all questionable, certainly should not be reported to anyone, be they social workers, teachers, or physicians, if they are going to make use of them as final labels. Because of this danger, intelligence quotients should not be reported unless they fall within the average or above range. Re-examination at yearly intervals should be requested until such time as the psychologist has reached satisfactory decision concerning the child's mental growth. If a decision has to be made on the results of the initial test, as to whether or not the child is to be

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accepted for treatment, the intelligence quotient if low should be disregarded, and the opinion of the psychologist taken. An unfavorable intelligence quotient should be reserved for departmental consideration.

Psychological Consideration

All children with cerebral palsy will be physically different from the so-called physically normal individual. They should be conditioned to this. Their goals and ambitions must be commensurate with their individual difficulties. Early in their training their energies should be directed into channels where they can best compete in spite of physical defects. The individual with the speech difficulty can never be a radio announcer or singer; the individual bound to a wheel chair can never be a movie star, the hemiplegic can never be a concert pianist. This day-dreaming of things that are impossible impedes all progress and assures a complete failure of future adjustment. The dangers in such day-dreaming are obvious. Such thinking ought to be replaced by more productive, more purposeful ambitions.

For educational purposes, cerebral palsied children may be divided roughly into three large groups dependent solely on the extent of the physical handicap. The first group would be composed of those affects resulting from an injury which is not extensive. These individuals are ambulatory, have good use of at least one arm, and have good speech. The members of this group can frequently attend regular school classes.

In the second group are the non-ambulatory individuals who have good speech and good use of one or both arms. These children must necessarily attend a special school or special class in regular schools although they do not usually require particular individual attention.

In the third and most numerous group are those with more extensive lesions than those who fall into the first two classifications. To mention just a few, this group will include ambulatory cases whose written work must be done by means of an electric or mechanical typewriter; hemiplegics and quadriplegics with a major

speech defect; those with various combinations of ear, eye, and speech impairment. All in this group will require instruction that must necessarily be more or less individual. For all of these, special adaptations in the curriculum and individual standards of accomplishment must be set up.

The solution of the problem of the cerebral palsied child is far from being one solely of muscle training. Nothing is more pathetic than a child with a spastic arm or leg approaching adolescence who in spite of having had the best physical training is rapidly becoming markedly introspective because of inability to adjust to his handicap. The tragedy of muscle training is that the child often responds well in the treatment room and home surroundings but is unable to integrate his emotional drives so that they will serve him satisfactorily when he faces new situations. The afflicted frequently use their handicap as a defense mechanism or as a means of escape from reality. In school the teachers are lenient with him. Should he not know the answer to a question asked of him, it does not take much effort to appear more nervous than usual, and thus the teacher feels sorry and takes it for granted that he knows the answer. Such a situation must be combatted with proper discipline. The child is often praised too much for physical accomplishments, like the ability to walk or bring a glass of water to his lips without spilling, acts to which in the case of the normal person, no importance is attached. Physical education is part of the program in every regular school, but the child is not made to feel that his success or failure in life depends upon his accomplishments in the gymnasium. Physical training should be carried on as a means to an end, rather than as an end in itself.

The factors of fear, anxiety, and self-consciousness have a tremendous influence on the cerebral palsied child's motor activity. The progress of a child who, in spite of his handicap, has already learned to some extent to make his way in the world will depend largely on the ability to cope with emotional factors. They either drive him into despair and isolation, where he can live apart from society and build an imaginary world, with the resulting mental deterioration which such an environment imposes, or he will face the world of reality with all his shortcomings and endeavor to

establish something which will compensate for his inefficiencies. As this compensating mechanism develops, he begins to feel that he is an integral part of society instead of an ostracized member. His greater assurance and confidence will make him all the more oblivious of his condition and less apprehensive of his shortcomings, all of which tend to integrate his emotional drives with a consequent increase in his muscular ability. In other words, it is the control of the emotions which determine progress. They either go to waste in the continuance of adventitious muscular activity and the child succumbs to his environment, or the emotional drives are utilized by direction into channels where they become productive.

The psychological factors in the cerebral palsied child are invariably more profound than the actual amount of brain damage warrants, and the teacher who bears this in mind can help the child immeasurably by teaching him how to meet new situations. Such a child is usually accustomed to living a life apart from others. When he is thrust into new surroundings suddenly, fear and anxiety prevent him from doing his best. Teachers must, therefore, not judge such a child's ability by his actions during the first day in school. They should create a condition around him which will enable him to anticipate what is coming next. A little guidance in assuring him he has mastered one situation successfully will make him less apprehensive about facing the next.

Behavior difficulties are greatest when treatment is made an end in itself rather than a means to an end. A girl who takes up typing to improve a paralyzed hand with the hope of becoming an efficient secretary is less likely to succeed than one who chooses a profession in which success is not contingent upon a cure. It is important for the teacher to have some idea of the degree of improvement that can be expected in order that the child's interest be directed along avenues of development which are the least likely to remain permanently impaired. Should it seem a physical impossibility for the child to realize his ambition, attempts should be made to divert his interest into related fields. This is especially important during adolescence, when the child develops a morbid

attitude toward his handicap unless he has by that time learned something which will compensate for his affliction.

The limitations imposed on the child who does not walk, with regard to contact with his environment, are difficult to measure. Our assumptions with regard to a child's self teaching are to a great extent dependent upon the fact that he is able at first to crawl around and later to walk around touching all sorts of objects and coming in contact with a variety of materials. How much this environmental self-learning is limited by the inability to walk or crawl at the proper time is difficult to determine since the variations among the affected cases are so great. The limitations of the use of the arms for coming in contact with various materials and objects, is equally impossible to measure. When the limitation in the proper use of the arms and legs is combined with an eye defect, a hearing defect or a lack of sensation, as described in the spastic, it is practically impossible to evaluate the child's potentialities under ordinary test circumstances.

In the child who does not speak but who has good control of the arms, and who has no mental defect, there is frequently developed a speech substitute or sign language of some sort. However, if this child also has involvement of the arms and legs so that a real sign language cannot be developed, then communication systems are definitely limited and it is again impossible to measure the effect on the child's fundamental abilities by these limitations.

It can be seen, therefore, that an entirely different psychological set-up from the normal will be developed by these children and that it will not be characteristic of each type. There are, however, a few fundamental psychological attributes which are observable in these children in their respective groups. Thus, for example, the athetoid child is found to be almost universally lacking in any overdevelopment of fear, whereas the spastic child is filled with fears of all types, and is considerably limited in his activities by their presence. The ataxic child does not show much variation from the normal with regard to fear.

The emotion of affection is found to be very highly developed in the athetoid, whereas in the spastic affection is only shown in connection with protective measures. The athetoid is extraverted

and makes friends easily and widely and is not particularly concerned about his handicap. The spastic, on the other hand, is introverted and is fearful of strangers and takes considerable time to make friends.

With regard to anger and rage it can be said that the athetoid shows a great deal of rage or anger and is likely to be much more the victim of his dislikes, whereas the spastic on the other hand is much slower to anger and when he is angry it is usually a very short-lived emotion. These differences are simply brought out as fundamental differences which are usually found and which are often helpful in setting up the teaching program for the particular types of children.

To distinguish the psychological progressions in these children from the normal to the abnormal and to differentiate between the psychological emotional set-up of a mentally normal child and a defective child in the group is difficult. There are defective children in the cerebral palsy group but, on careful analysis, the percent of true mental defect due to the actual thinking part of the brain as opposed to the motor or sensory part represents only about 25 per cent of the total number of cases. In the presence of great difficulties in testing and evaluating the mental level in these children, it can only be said that all of them should be given the benefit of the doubt until they have actually been proved to be unteachable, when all of the various handicaps have been taken into consideration.

Motor difficulties. On the motor side, it can be said, therefore, that in all three of the types of cerebral palsy there are three fields of difficulty. These represent the legs with regard to locomotion, the arms with regard to self-help, and the speech and face mechanism. The speech and face are combined, since the children with speech defects usually, although not always, have an accompanying lack of control of the facial muscles.

Sensory difficulties and speech. On the sensory side there can be difficulty with vision due to abnormal or involuntary motions of the eyes which affect reading and writing to a great extent. There may be limitations of hearing especially in the athetoid child. In this group there is a rather characteristic type of hearing defect.

It is not seen in all of the children but is present in a certain number of the athetoids. This hearing defect is on a pitch basis entirely and is not related to the loudness of the sound. This is frequently overlooked. Many children have been seen when a definite hearing defect has been discovered although the parents have never been aware of it even in children as old as eight or nine years. This is because the hearing for noises is not affected but only the hearing of high pitch. It can be best determined by studying the type of speech defect the child presents, after which the cut-off level of the hearing impairment can be measured by the sounds which are lacking in the child's speech, since no child will use in speech sounds which he does not hear used when spoken to. Many children have frequently been considered behavior problems because of this hearing defect, especially when the cut-off is low, so that speech to them is almost unintelligible, and they have to make great efforts to determine what is being said because of the similarity of the sounds of many words. Others of these children have been considered defective because of their lack of response to speech stimuli. Still others have had the speech defect wrongly based upon the presence of athetosis on the assumption that their speech difficulties were due to the presence of athetosis in the tongue, with inability to form the words. Athetosis does occur in the tongue and there are athetoid speech defects which are definitely associated with limitation in proper use of the tongue, but these speech defects must not be confused with those due to a hidden hearing defect. It is not always possible to carry out a careful audiometric test on these children so that a great deal of dependence must be placed upon the type of speech defect and the determination as to its cause by the type of defect which is found. The absent higher sounds in speech are those usually associated with a letter "S", and with pronunciation of high vowel "E". These children may lack the sound of "E" and pronounce words containing this letter in the tongue position of "A" or "O", and will eliminate from their words the use of the letter "S" and perhaps "T" and "K" also. If this is consistent, it can be assumed that the speech defect is due to a hearing defect. The true athetoid speech defect, due to involuntary motion in the tongue is entirely

different in that words are never pronounced the same way twice, since the involuntary motion in the tongue can never be synchronized with the voluntary motion. Thus, a very difficult and unintelligible speech will be developed. In the spastic on the other hand there is little probability of an associated hearing defect, and the speech in the spastic is characteristic. The tongue shows spasticity in these cases, and although there is a definite speech defect the "language" can be learned by those associated with spastics. It can be seen that the speech in the ataxic would be entirely different because in that case the position of the tongue is indefinite and cannot be accurately placed.

The treatment of these various types of speech defects will only be accomplished by a careful classification. There are essentially four types of speech defect: the true athetoid speech defect, and the spastic speech defect, the ataxic speech defect, and finally speech defects in the athetoid, secondary to the hearing defects.

Speech is affected in the majority of cases. It is a very intricate muscular process and its disturbance is closely linked with the general condition so that one cannot hope for much improvement until the child has learned to control the larger groups of muscles or has acquired a general improvement. Not infrequently, speech or acquisition of speech occurs with the successful accomplishment of coordinated muscular movement without special emphasis being placed upon speech training itself. Tongue placement exercises in front of mirrors are useful in training the speech. This procedure is preferably carried out by the use of a blackboard so as to enable the child to write in large letters at the same time that he attempts to pronounce the word that he is writing. The movement of the hand and arm often will take care of some of the excessive flow of nervous energy which interferes with speech. Speech is likewise improved when the child focuses his eyes at a certain point in speaking. This is one of the reasons why lip-reading is valuable in helping the general type of speech difficulty present in cerebral palsied cases. If the person has to read lips, he will obviously have to look at the one whose lips he is reading and in so doing, he cuts down his vision with a consequent decrease in adventitious muscular activity. The use of the microphone and loud speaker

is likewise helpful in speech training. In talking, the child is likely to put out more energy than he can control with the result that his speech becomes indistinct. With the use of a microphone, he is able to speak above a whisper and make himself understood, with the least amount of effort. The result is that he speaks more clearly with the use of a microphone than under ordinary circumstances.

Children with a speech handicap of their own are often made to listen to oral reading or give dictation to other pupils. They become so engrossed in conducting the exercise assigned they forget their own speech disorder and better speech results.

Lip reading and very low-voiced speech have been used even with those who have no hearing impairment. While concentrating on the lips of the speaker, adventitious muscular movements are reduced and speech is more readily understandable. A microphone used for certain lesson recitations and for speech work and reading has also proven effective. Use of the microphone necessitates less effort in the actual production of speech. By merely speaking above a whisper the pupil can be heard and understood. This lessening of effort results in smoother, easier and more intelligible speech.

The correction of speech difficulties in the cerebral palsy group depends on the type of the cerebral palsy. The athetoid has athetoid speech, which means that there is involuntary motion present either in the diaphragm, breathing mechanism, larynx, tongue or lips, or in any combination of these. Obviously, the same underlying method used for the arms and legs must be used for the speech, and the tension and force must be eliminated entirely from the speech training.

Speech training in these children is often a triple cooperative activity. The speech teachers may give a period of intensive work for a half hour or an hour daily, but during the rest of the day the child's speech becomes the problem of the school teachers and the others associated with him during his leisure hours. The work which is accomplished by the speech teacher may be entirely undone if those who are working with the child at other times are not fully aware of what is being attempted at any particular time. It is also essential that the speech teachers be entirely familiar with the three types of cerebral palsy in order that they can understand

the work which is being done physically with the arms and legs, and in school, to coordinate their efforts with speech.

In the ataxic, speech training is a difficult problem because the problems are the same as the ataxia in the arms and legs. However, the same methods should be utilized, such as attempts to bring about voluntary placement of the tongue in various positions to precede the actual use of words.

Reading

Reading difficulties of the cerebral palsied, even in those with no hearing and visual defects, are a frequent occurrence. It is not unusual to find many of these children in sixth and seventh grades when their reading accomplishment is lower than second grade. Learning to read by the sight method of learning phrases and short sentences is ineffective in these cases. A far more effective method is to teach reading from a sound foundation of phonics. This method is slow and, as with so much other work with the cerebral palsied, makes added demands on the teacher for individual attention. In addition to its value in remedial reading; the study of phonics has proven of considerable help for those with speech disorders. Therefore, with a group of primary graders who are just learning to read, the phonics method rather than the phrase and sentence method should be used.

Muscular disfunction in those muscles that control the movements of the head presents added problems to the teacher. A torticollis may make it difficult or impossible for the child to read due to the jerking movements of the head. Physiotherapy may be able to correct this condition or it may be improved by constant practice in holding the head still while reading. But, in the meantime, along with doing whatever reading he can do alone, such a child must have a certain amount of reading done to him. It is also helpful for these children with such an affliction of the neck muscles if their reading material is re-typed with larger print and more space between the words and lines.

Educational Problems

Education should be available to all children with cerebral palsy who are of average intelligence irrespective of the possibilities of

treatment. When one considers all the waste among those not physically handicapped who in spite of educational opportunities do not make good citizens, it does not seem unresourceful to devote more attention to the cerebral palsied, many of whom with proper training might excel the average citizen.

Many schools are so arranged that the child who does not walk cannot be satisfactorily cared for. This limitation, if the teaching of cerebral palsied children is to be undertaken, must be overcome. The assignment of the non-walker to home treatment is one which is not justifiable. In many instances the brightest, most hopeful cases, are those which have difficulties mainly in the legs, and to be excluded from school because of the inability to walk is not a fair discrimination.

The re-training of arms requires cooperation between the physical educators and the teachers. Arm use is essential for writing, and the manipulation of a typewriter. Typewriting should be considered as a substitute for longhand writing in cases where it can be taught more easily. There is no use in spending many hours a week for years teaching a child to write longhand if the time can better be spent in teaching him other activities. The use of the typewriter in the school should be urged for children with handicapped arms. It is advisable to train these children in the use of a written signature for legal purposes if possible, but beyond this point the use of longhand writing is not essential.

The decision with regard to right- or left-handedness must be given careful thought. It may be unwise to insist upon right-handedness in any child, and this is particularly true in the handicapped. In the case of a mild right-sided handicap, "if strong right-handedness is inherited, there is often a persistence in the use of the right arm which brings about a persistence in the use of the damaged left side of the brain. If in some of these cases where no progress is being made in school and the outlook appears unfavorable mentally, it may be desirable to shift-over to left-handedness. Much of the work that has been done on this subject is theoretical, but it is well to bear it in mind. In some instances, attempts to develop the handicapped hand more than the normal

one have brought about difficulties with speech, usually manifested by stuttering or hesitation, and this may be an indication of a tendency to shift from one to the other speech center. Therefore, when training a handicapped arm, when the other one is normal, it is frequently important to train the normal arm also in order to assure that the handedness remains fixed.

It may be found advisable to train these children in the use of the arms with very large motions since in many instances the use of small motions will tend to increase the amount of tension. Therefore, there should be close cooperation between the physical re-educator and the teacher so that the child may be limited to the use of a crayon strapped to his hand, and to the writing of large letters on a blackboard. The attempt to make small motions in writing and to grasp a pencil may hinder the work which is being carried out in the physical rehabilitation. This is only an example, as the opposite condition may be true. Some children should be limited to small motions and not allowed to make large ones. All of these variations can be worked out by close cooperation of physicians and teachers but should not be assumed by the teacher without thorough knowledge of what is being taught in the physical rehabilitation.

The hope for complete cure is uppermost in the minds of probably all "spastics" and their parents. This is shown by the emphasis that has heretofore been placed on the physical side of the problem—an emphasis that does not end with the patient, parents, physicians, and physiotherapists, but also extends to legislation. Every state provides some medical and physical care but no more than fifteen states have an educational program that may be termed "promising." Too often the education of the individual is postponed until he learns to walk or speak, or use his hand well enough to write. These desired improvements may never be attained.

The curriculum for the cerebral palsied children must tend to be an individual one. Such factors as varied age groups, widely separated grade levels, extremely different handicaps with different degrees of multiplicity discourage work in sizeable groups. It is easy to understand how, in a small group, the age and grade levels may vary considerably. More must be said, however, about the last

point of the handicaps with which the teacher should be prepared to cope.

Figures for those with some hearing defect are variously quoted as being 10 to 20 per cent. Visual impairment may be present in more than 50 per cent of the cases and as many as eight out of 10 may have some speech disorder. The figures are not definite and show a wide range. Yet the inconsistencies they exhibit are not important. What is important is that these handicaps, visual, auditory, and speech, are to be expected and the school program must be a workable one under these circumstances. All three above handicaps and various combinations of the three are often seen in the same individual. This multiplicity of handicaps makes the academic training slow and complicated. Yet organizations that would provide a comprehensive program for the child afflicted with cerebral palsy cannot draw lines that would bar these multiple-handicapped individuals because they are too numerous.

Many states have set a minimum intelligence quotient as a prerequisite for admission to a special orthopedic class or school. Because of the various combinations of handicaps and the frequency with which more than one handicap is present in one individual, the cerebral palsied are not likely to receive a fair rating from any type of intelligence test. Pending more satisfactory methods of measuring intelligence, it is advisable to give such children the benefit of the doubt and admit them for trial periods in special schools and classes.

But education for its own sake is not enough. Of what ultimate use will physical improvement be, what incentive will there be for educational advancement, if the handicapped person cannot hope to achieve a position of worth by these means?

On numerous occasions it has been seen that a job has brought about more physical improvement in an individual than physiotherapy or speech training could hope to accomplish. In the field of vocational guidance, therefore, new vistas must be opened for people handicapped by cerebral palsy to enable them to find a place in the world. The promise of proving their utility by their physical and educational achievements is the factor that gives reason for physical and educational programs for the cerebral palsied.

To have the child do as much as possible for himself and to build up and encourage a desire to do independent work is of primary importance. From the standpoint of any teacher who must handle a multigraded group, the importance is obvious. It is even more necessary when this multigrade group is an orthopedic class, many of whose members may have, moreover, reading, speech, hearing and visual disorders. If these pupils cannot work by themselves, the teacher will not be able to handle many pupils.

Independent work is closely linked with the idea of concentration. While working with the electric typewriter, arithmetic work-board, anagrams, or other self-help means, the pupil is achieving hand-eye coordination. The number of stimuli to which he can attend, in so doing, is considerably reduced and so we say, "The pupil is concentrating on his work." It is too easy for the teacher or assistant to give too much help or drop inadvertent hints to the pupil. The accomplishment under these conditions is not a true one. The education of these children must be definitely purposive. It should not be viewed with the idea of giving them as much as they can absorb without too much discomfort or of merely keeping them occupied. The teacher should have a full and careful description of the particular type of cerebral palsy and the handicaps from which the child is suffering. They should be able to evaluate such reports and should have a clear idea of what is being carried out in the other fields of activity besides teaching at each point in the child's development.

In many instances where those children are scattered throughout rural areas, it has been found possible to assign one such child to each teacher's class. After giving the teacher a careful and full description of the child's particular difficulties, and after a careful explanation of the methods necessary to teach that child, most of these teachers have become enthusiastic about the results which they have obtained. It is not wise to burden the teacher with more than one of these children at a time. A teacher with a class of from thirty to forty children can satisfactorily teach one cerebral palsied child with the class. At first, the teacher's usual response is to be afraid to take the child and to feel that he will work too much of a hardship on the other children because of the time that must be

spent on him. By explaining the difficulties of the child, and outlining the various techniques necessary, teachers have produced satisfactory results. Experience has shown however that if a child is transferred to another class, the teacher of which has not had the benefit of an explanation of the child's condition, all progress ceased until this explanation was made.

In cities and in other places where special schools have been established for cerebral palsied children it has been found that if all types of handicaps are included in the school, it is best to limit the number of cerebral palsy cases assigned to each teacher to as few as possible to accomplish the best results. This is because they differ so widely from each other and from other handicapped children, that it is impossible for the teacher to set up methods for teaching a large number of them at one time.

If, however, special schools are to be limited to the cerebral palsied, the situation becomes an entirely different one. In these instances it is supposed that the teachers will have had special training in the methods of teaching the handicapped in general, and special training in the teaching of cerebral palsied children. In such classes the teacher should have assistants to carry out the various activities with these children, such as writing for them, turning the pages of books, or taking dictation, depending upon the type of handicap. It is often necessary for these assistant teachers to understand sign languages and to make special studies of each child in order that the work which is dictated by the teacher in charge may be worked out with them. This calls for increased personnel, but it has been worked out in many instances without excessive expense since these assistant teachers are frequently in training for special work with the handicapped, and may not therefore command salaries. The size of classes should be regulated by the degree of handicap, and where the handicaps are relatively severe, one teacher should not be assigned to more than five or six pupils and then only if one or more assistant teachers are provided. When the pupils have only involvement of the legs or perhaps single involvement of any other type, the classes can be larger as the teaching problems are simpler.

The failure of many attempts to teach children suffering from

cerebral palsy, or cerebral spastic paralysis, results from the fact that frequently only the motor disturbance has been given attention, and has been treated in the same way as the difficulties resulting from infantile paralysis. This has proved entirely unsuccessful for two reasons. In the first place, the condition is not a single disease, such as infantile paralysis, but one of a group of diseases. In the second place, it is not a simple condition affecting only the motor power of the arms and legs and trunk, but a complex one involving the sensory and sometimes mental powers as well.

Cooperation between physician, teacher, parent, and child is essential for a successful educational program. A dual problem confronts every crippled child. He is a cripple because of a mechanical difficulty. He becomes a behavior problem unless he can adjust to the mechanical difficulty. This is especially true when prolonged treatments are necessary. The child who loses a leg gets a wooden one. He adjusts to his handicap sooner than the cerebral palsied who must take years of treatment to improve an involved limb, which in itself may not be as severe a handicap as that of the boy with an amputated leg.

Cerebral palsy must be considered in its various types and these types must be recognized by the teachers and educators in order to carry out a satisfactory plan for teaching. This does not mean that teachers treating these children must be medically trained, nor familiar with the medical details of the condition, but they must be able to recognize the various types when they appear with a reasonable degree of accuracy in order to evaluate their own problems in teaching.

In the teaching of the handicapped, it is frequently possible to determine the individual type of handicap such as blindness, paralysis, deafness, or lack of speech and to set up teaching methods which will be applicable to these various classes of difficulties. The cerebral palsied child, however, frequently represents combinations of handicaps each of which may be of minor degree when considered alone, but which, when grouped, produce a major handicap and consequent difficulty in teaching. The fact that these handicaps have persisted since birth must also be kept in mind in order to realize that many fundamentals easily learned by normal chil-

dren have never been approached by the children with cerebral palsy due to the limitation of their environment.

It can be seen that in the educational field, the treatment of cerebral palsy is very specialized and requires careful training of the educators who are to undertake it.

Classroom Equipment

It is necessary that the desks and chairs for these children be constructed specially in many instances, or at least be sufficiently adjustable to allow for their difficulties. The balance difficulties found in the ataxic frequently necessitate some form of seat to which the child can be strapped and held in position satisfactorily so that free use of the arms and head can be made without the necessity for holding on, thereby limiting the use of the arms, or dropping forward of the head, so that he cannot see what is being put before him. It is often wise to have a reading board put up on the desk in such a way that when reading is called for, the head will not have to be dropped forward into an indirect position. This is doubly necessary if the arms are involved, since the ability to hold the book may be very much limited. If the child is an athetoid, it may also be that attempts to hold the book will shake it around so much that it will be impossible for him to follow the printed page. The teacher should face the children in such a way that sight handicaps and hearing handicaps are taken into account.

Physical Education and Treatment

The cases which should be specially excluded from physical education and treatment are first, those who show severe mental deficiency, or even moderate degrees of mental deficiency if they can be proved to be actual. A second group are those cases which have an associated epilepsy. Finally those cases of cerebral palsy as a result of epidemic encephalitis and with exacerbations of the disease with gradual mental deterioration should be excluded. All forms of encephalitis do not have this progressive course. Those

following the exanthemata, such as measles, and those following whooping cough are usually self-limited. The motor disturbances following the disease are treatable.

In the consideration of cases for treatment it is also important to decide what the ultimate aims of treatment are to be. A very severe case may be seen who has not any ability to walk, no use of the arms, no speech, and who is hardly able to turn over in bed, much less sit up. It might be thought at first that this type of case should be excluded from a treatment program. However, the greatest need of a child of this type, assuming that he has normal mentality would be the need of speech, and it is possible that by appropriate treatment, speech could be brought to this child and so change his entire life.

Another case may be seen in which the legs are so involved that it would be practically hopeless to retrain him to walk. However, if the arms in such a case were sufficiently trainable to result in the ability to dress and undress, get in and out of a wheel chair and wheel it, the child would be relatively freed from the care of another person. The case in which the arms and speech are fairly good but in which the legs are bad is an obvious case for retraining for walking. In each case where it has been decided that treatment would be effective, the aim of such treatment should definitely be thought through and determined in advance.

The treatment may be considered under three chief headings. First, treatment by physical and occupational therapeutic measures. Essentially, this consists of retraining and re-education of muscles to perform functions which have been performed wrongly previously, or to teach muscles to contract in different groups or separately when only mass contraction has been had previously. The second field of treatment includes the use of apparatus, braces, corsets, shoes, plates and other such aids. The development of braces with springs, and special control mechanisms advocated in the last few years are often useful either in preventing certain unwanted motions or in bringing about motions in certain places, limiting contractures in other places, in many of these cases. The third field of treatment is surgery. These types of treatment may be, and frequently are, combined, some being more useful in one indi-

vidual, and other combinations in others. Although these cases can be divided into the three groups mentioned—athetosis, or involuntary motion, spasticity, and ataxia—in reality there are no two cases exactly alike and the treatment must be varied to fit the individual case.

The athetoid may be one of two definite types, the first is the nontension athetoid who makes wild or free motions without much resistance. The second, the tension athetoid, who attempts to stop or block the athetoid motions.

A muscle examination of an athetoid patient may show that some of the muscles seem to show athetosis with considerable regularity, while other muscles do not appear to show it at all. However, on more careful examination, it can be seen that this athetosis is not localized to certain muscles but is more an involuntary attempt on the part of the patient to make a motion in a certain direction. Thus, some cases have been seen in which the apparently offending athetoid muscles have been cut surgically and the athetosis continues to be present with the joint moving in the same direction with whatever muscles are left. High cordotomy has improved some of these cases.

Athetosis is particularly characterized by the fact that during sleep, the patient becomes entirely quiet, and that the greater the degree of complete relaxation obtained in the patient, the less the amplitude of swing of the athetoid contraction. The athetosis cannot be entirely eliminated by relaxation but can be so diminished as not to be a factor in the use of the muscles. After sufficient relaxation has been learned, then motion from the relaxed position can be taught without bringing in tension sufficient to re-establish the athetosis.

Relaxation must be learned with great care and over a long period of time, as ordinary relaxation is not by any means sufficient to bring about a reduction of the athetosis. It is best to teach relaxation if possible through the normal muscles first in order to train the patient in what actual relaxation is. When this has been learned it can be applied to the athetoid muscles. Voluntary contractions are resorted to in order to give the patients the feeling of tightness in a muscle so that they may then learn what the

opposite feeling, or complete looseness really is. It is often seen that athetosis will not subside until relaxation has been made complete throughout the whole body. The results of the treatment of athetosis by means of relaxation and motion from the relaxed position are really excellent if the technicians are sufficiently trained in the proper teaching of methods of relaxation and do not attempt it by ordinary hit or miss methods.

In physiotherapy and occupational therapy work, various devices are employed to focus the attention of the patient on the object in view. The patients are made to walk along lines painted on the floor, to follow the direction of a cane held in front of them, they are fitted with opaque glasses that permit them a very narrow field of vision, etc. In the schoolroom, too, various means must be constantly sought to center the attention of the pupils on the specific task at hand. As the pupils project themselves more into this work and forget themselves and their difficulties, there is a noticeable improvement in the quality and quantity of work accomplished. One boy was so handicapped he was constantly sliding off his chair onto the floor. Yet, when this same boy concentrated on the correction of the arithmetic problems of other pupils, it was noticed that for periods of more than an hour he did not slip from his chair.

If the cerebral palsied have only memories of bizarre muscular movement, it is obvious that they will lack correct use of muscular relaxation in early conditioning. It is by the means of repetition of conscious muscular acts that our movements become automatic, and we do them with the least amount of conscious effort, like playing the piano and reading music at the same time. But there are stages in development when no matter how much we repeat an activity it is not going to become automatic. Stepping movements for instance show themselves almost immediately at birth but no amount of exercises is going to enable the normal infant to walk until his nervous and muscular system has attained sufficient growth, which is usually around a year old.

The physical improvement that is possible through exercises for the cerebral palsied depends upon growth factors. One child may have its growth arrested at a stage of development where repetition

of an activity may produce no results, whereas another has unlimited possibilities of improvement. It is important to know what can be expected in the way of physical progress so that attention can be devoted to mental factors.

It is difficult to prescribe any one set of rules for specific types of exercises. For proper relaxation a calm and quiet atmosphere is necessary. The exercises must be adapted to the individual case and depend largely on the clinical findings. The chief aim of the exercises is to teach the patient to make each active movement with a minimum of muscular effort. The teacher should be a person with temperament and personality that is conducive to relaxation. Before the exercises are started there should be a preliminary relaxation period. In spastic conditions the degree of rigidity decreases with increase in range of motion of the spastic member, and therefore it is advisable to begin treating the larger muscle groups first and to defer training of the smaller groups until control of the bigger motions has been established. The first exercises should be the slow-coordinated rhythmical forms of movement, beginning with the major groups of muscles, such as those about the proximal joints, shoulder and hip, later including the muscles of the knees and elbows, and finally those of the hands and feet. This does not mean that a spastic should not be taught to write before the grosser muscles have been treated because many severely handicapped spastics learn to write without any treatment. We are prone to give too much attention to the obvious mechanical defects and fail to appreciate that there are often patterns for skilled muscular movements that can gain expression despite rigidity, especially when the emotional factors do not play a part in the muscular act. Placement exercise, such as walking on lines, putting fingers on dots, piling building blocks, driving pegs into wooden blocks, and placing pictures on boards, are helpful. In athetosis the aim should be to make the child very little muscle conscious. This can be done by limiting vision to work or by directing attention to the purpose of the act rather than to calling attention to the muscles. Such factors as anxiety, fear, and self-consciousness increase the abnormal movements and it is necessary to eliminate, as much as possible, the emotional element from the muscular act. Interesting activities,

such as occupational therapy, help to draw attention away from muscles. In ataxia much attention should be given to vision in training. The child must look where he walks or focus on an object which he is attempting to reach. This is often helpful in maintaining equilibrium. If necessary, the correction of vision by glasses, or correction of cross-eyedness by operation may be exceedingly helpful.

Spasmodic movements of the head and neck may interfere with speaking and reading on one occasion and not on another, depending upon the degree of excitement the child is under. Spacing the printed matter several lines apart helps such a child to read. Speech is also improved by having the child keep his eyes fixed at a certain point in attempts to talk or by teaching the person to transfer the tension to some other part of the body where it will be less disturbing as by having the child squeeze a spring device held in his hand on attempts to talk, such as the sprint runners use when running a race. Here again we must appreciate the motion patterns lying dormant behind the rigid muscles as is exemplified in a girl with severe spasmodic neck movements who could not speak in public. The muscles on one side of her neck had developed to twice the size of those on the other side; seeing her struggle to keep her head from flying to the side, one would not expect any improvement possible until physical training had equalized the tension. Yet, when this girl is in home surroundings and feels at ease, her speech is perfect and she has little or no difficulty in controlling her head.

Any surgery that is done usually has to be followed by muscle training. Mechanical appliances such as braces, shoes, walkers, chairs, etc., must be prescribed by the physician to fit the individual case. In severe athetosis and spastic conditions, braces or supports may aggravate the condition, whereas in mild cases where there is much weakness of the opposing muscle group braces may be of great benefit. Children who must wear long leg braces often suffer considerable pain when their legs are held in an extended position for long periods of time. Under the circumstances these children do not put forth their best efforts in school. If the teacher will inquire when these braces may be bent or when the child may be per-

mitted some walking exercises, she will gain greater cooperation from the pupil. Wearing a brace with joints at the knees when the child is sitting at his desk in school will often hold the lower extremities quiet and thereby improve speech and control of the hands. The tension on a single muscle group may affect speech as well as coordination of the hands. The seats should, therefore, be adjusted so that no muscles will be kept at a stretch when the child attempts to talk or write. High heels on shoes where there is a tight heel cord will often do more to prevent deformities occurring in other parts of the body than the benefits from keeping the heel cord stretched by using a low heel. One child's heel came down by itself after he learned to relax his arm. If a walker is necessary, it should be designed so that the mildest push will send it in the direction in which he is looking. Pushing a weighted doll carriage and walking between parallel bars help the child to look where he is going. The child must learn to go forward instead of backward when falling—a faulty habit acquired because the attendant goes behind the child in teaching him to walk.

To combat drooling the child should be taught to swallow when his mouth overflows with saliva. Drawing too much attention to the drooling increases the flow of saliva.

Exercises to correct breathing are important. The tendency of the cerebral palsied is to have reversed breathing, that is, he speaks on inhalation instead of exhalation. Exercises in talking before a candle flame and having the flame go away from the child instead of toward him when speaking are helpful. The child must not be made too speech conscious. Any exercise which tends to improve the rhythm of respiration will relax the muscles in general. The cerebral palsied person has a habit of holding his breath. He subsequently hyperventilates; this increases the tone of his muscles. Maintaining uniform rhythm of respiration is an important factor in muscular control.

Combination of lack of use of the arms for writing and inability to speak may be present and, at the same time, there may be a perfectly normal underlying mind, but the expression of this mind is so limited that actual measurements of mentality are more or less useless and methods of teaching difficult.

Summary of Physical Education and Treatment

To determine the advisability of treatment in cerebral palsied children, it is important to classify them. It must be decided first whether the problem is one of locomotion or of re-education of the arms. Perhaps the problem is one entirely of speech. On the other hand, there may be only the problem of grimaces, drooling, and other variations from the normal which strongly interfere with the child's ultimate placement in society. The mentality must be evaluated. This must be done carefully in order not to make a false determination of mental deficiency when the true mentality is simply masked by handicaps. The condition may be a severe one with obvious defects of the use of the arms, legs, and speech, while on the other hand the condition may be mild but with a combination of a larger number of very minor handicaps which mask the underlying ability of the child.

A second classification must be made of the type of cerebral palsy present. The three types of cerebral palsy mentioned cover fairly well the entire field of cerebral palsy disturbances. Tremors are found as a result of cerebral palsy, but these tremors in general may be considered as involuntary motion, which is of a rhythmical type instead of the diffuse irregular type seen in athetosis.

The four chief fields of treatment are the legs, in regard to locomotion, the arms, for rehabilitation with regard to all types of self-help, the speech and face, and the mental or educational phase. It may be said that these children differ from the ordinary types of crippled children in that the two additional fields, namely, the speech and face, and the mental difficulties are not encountered in the usual crippled child. In other words, the problem of the usual crippled child is merely that of improving or bringing about effective locomotion, or improvement in the use of the arms and trunk. However, the absence of speech and the presence of grimaces, contortions, or mask-like face, bring about complications with regard to the determination of the mental level and often result in a false determination with regard to the underlying mentality. The fourth field, the educational one, deals, of course, with the trainability of the child along mental lines.

Conclusions

Treatment and education must be intensive to be effective. The best solution of the problem is the special hospital school set up primarily for these cases. Here progress will be most rapid. However, training in special day schools is effective when the therapeutic personnel is sufficiently large to assure at least three treatments a week for each case and when thorough cooperation can be relied upon in the home.

Since there is some statistical evidence indicating that 25 per cent or less of the cerebral palsied are feeble-minded, it is imperative that the other 75 per cent be given the advantages of proper educational as well as physical rehabilitational facilities. The number of cases which exist in any city being 7 per 100,000 population per year, shows that the condition is a real problem and one which it is necessary for both physicians and educators to face. Other types of physical handicaps, as those produced by rickets, tuberculosis, and the like are decreasing in number. There is no likelihood in the near future, as far as can be seen at present, that cerebral palsy will be conquered to any great degree and it is becoming one of the greatest causes of crippling in the field of crippled children. This must be taken into account and methods of training and methods of treatment and education must be set up which will develop these children into more capable members of society. The education of children with cerebral palsy is a distinct problem which requires concurrent physical and scholastic education. The children with satisfactory muscular coordination who are mentally normal can be profitably educated in the special orthopedic classes. Many of them can adapt adequately to the regular class curriculum. The extent of muscular involvement in these children varies from severe to slight and selection for special classes should be only on the basis of the recommendation of a physician whose experience in this highly specialized field qualifies him to judge of a child's physical and mental abilities.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

This Committee is of the opinion that special classes for orthopedically handicapped children can be justified only if they serve to protect children from physical harm which might occur if they were permitted to attend regular classes and mingle freely in all of their activities with normal children. There is a need for such classes in the public schools of New York City.

If special classes are provided, such classes should afford these children an educational and rehabilitative program individualized to meet their need and designed to enable them to return to regular classes as soon as possible.

As constituted at present there is no medical or corrective purpose served by these classes except as such services are provided in a limited degree by voluntary agencies. Likewise, the educational program has no relationship to individual handicaps and eventual vocational training.

The school units for orthopedically handicapped children should be of sufficient size to make it possible to conduct classes covering a single school year or classes having a grade span of not more than two full years at most. The educational program should include the full curriculum provided for normal children. The children assigned to the special classes should participate in the general activities and utilize the special facilities of the schools to the degree that their abilities permit.

Facilities for the physical development of the children should be a part of the units of orthopedic classes and a program of physical activities based upon the recommendations of the children's physicians, and conducted by qualified physical educators, should be substituted for the usual physical education work given normal children.

The inactivity fostered by assignment to these classes, as conducted at present, is, in many cases, distinctly harmful to the chil-

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dren because it tends to limit the development of their physical abilities and their natural adaptation to normal activities.

Simple physical therapy equipment should be provided and physical therapists should be employed to give treatments to those children for whom it is prescribed by their orthopedists or clinics. The committee is of the opinion that such treatment is more within the province of the Department of Hospitals than that of the Board of Education. It is impressed, however, with the necessity for making these treatments available within the schools to avoid the need for transporting children to and from the existing clinics and the consequent loss of excessive amounts of school time. It feels that physical therapy should be provided for each unit of classes for orthopedically handicapped children through whichever department is administratively most practicable to secure it.

The Division of Physically Handicapped Children has failed to develop a suitable program for orthopedically handicapped children and it is the opinion of this Committee that it is necessary to place it under new direction before such a program can be developed.

The work being done at present appears to justify few of the claims made for it by the Assistant Director in Charge of the Division or those found in the official reports to the Board of Education.

RECOMMENDATIONS

The Committee has found that the program for orthopedically handicapped children as it is now being conducted is not meeting the needs of these children and makes the following recommendations:

1. That there be placed at the head of the Division for Physically Handicapped Children of the Department of Education a competent administrator with understanding of and sympathy for handicapped children who has the vision and capacity to develop a program which is intended to improve their condition, and who will utilize the medical, social and educational resources of the City to this end.

2. That there be provided a clerical staff large enough to attend expeditiously to the clerical and other routine work of the Division.

3. That the record system in the office of the Division and in the schools be modernized, that the forms upon which individual records are kept be revised to give more complete information and that they be kept up to date. That the complete record for each child be filed in suitable folders and that these be indexed by pupils' names and also by schools.

4. That there be appointed by the Board of Education an advisory committee composed of physicians, including orthopedic surgeons, to advise and assist in the development of an adequate program of physical care for orthopedically handicapped children at all levels of the school system.

5. That definite criteria for the admission of children to the special classes be established and greater flexibility in transferring children to and from these classes be accomplished.

6. That the assignment of children who belong in these classes be expedited, and that those children who are not in need of protective care and who can adjust to regular classes be returned to them.

7. That School Medical Service be extended to include orthopedically handicapped children.

8. That the buses used for the transportation of children to and from school be owned and operated by the City. They should be

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limited to a capacity of 15 or 20 children and the assignment of children to schools should be carefully planned to reduce to a minimum the distance that they are transported. Children should be called for and delivered at their homes. Transportation should be provided only for those who actually need it and not necessarily for all crippled children. The attendants in the buses should be efficient and physically capable of assisting the children. For psychological reasons the busses should be designated simply as school buses and not as crippled children's buses.

9. That the classes for crippled children begin at the kindergarten level.

10. That special schools for crippled children be constructed and that at least one such school should be located in each borough. These buildings should be equipped with elevators, ramps, rest rooms, lunch rooms, playgrounds, physiotherapy rooms, shops, etc.*

11. That if special schools are not attainable now, it is recommended that at least one such building be constructed which would serve the children in one borough. Because the number of crippled children in Brooklyn is much greater than in any other borough, this school should be located there.*

12. That in the absence of special schools, the special classes for children crippled by orthopedic conditions be consolidated into larger units, containing a minimum of six classes. That these be placed in already existing school buildings, remodeled to provide elevators, ramps and facilities for such accessory services as physiotherapy, rest rooms, lunch rooms, accessible toilets and facilities for comfortable relaxation.

* The Public Health Relations Committee of the Academy of Medicine is opposed to the establishment of special schools. Some members of the General Committee, including its Chairman, are likewise opposed to these recommendations. The reasons for their opposition are:

- (a) There are thought to be too few children in any one area of the city to fill such a special school, without transporting them excessive distances.
- (b) Opposition to the general principles of segregating children in special schools apart from normal children.
- (c) Where extensive and prolonged medical treatment is necessary for children who are severely afflicted and require much assistance, it is thought best to give them instruction in hospitals rather than build schools to accommodate them, the primary problem being a medical problem, and not an educational problem.

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13. That children who are unable to walk but who can get about in wheel chairs be permitted to attend school when proper facilities as mentioned above are provided for them.

14. That there be appointed by the Department of Health an orthopedic surgeon and assistant surgeons on a part time basis to assist the school physicians and to pass upon admissions to and discharges from orthopedic classes.

15. That children in the special orthopedic classes be examined medically at least twice each year preferably before the beginning of each semester.

16. That there be established a more thorough liaison between clinics and the schools to the end that each may have a better understanding of the problems affecting the orthopedically handicapped child. Existing private nursing agencies and the school nurse should be utilized to a greater extent for this purpose.

17. That medical inspection be furnished by the School Health Service for homebound children for whom home instruction is requested in order to eliminate those who are able to attend school and others who are incapable of profiting from instruction.

18. That the children now under home instruction be re-examined by the School Health Service to determine whether their condition will permit them to be re-admitted to school.

19. That the policy of providing home instruction be continued for children whose physical condition is such that they are unable to attend school.

20. That home instruction when necessary be extended for high school children.

21. That the school program for each child be planned in relation to his physical abilities, based upon the vocational expectancy of the disabilities. This information should be provided upon the child's entrance to school by the physician or clinic in charge of the case.

22. That although multigrade teaching may be necessary to some extent until special schools can be built, there should be a reduction in the number of grades taught in one class to a maximum of four half grades.

23. That sufficient special classes be created for children who

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have both a mental and a physical handicap so that ones with low IQs (below 75) may not retard the progress of those who are normal mentally.

24. That there be added to the Division competent educational supervisors who shall be assigned to the supervision of the teachers of these classes. The supervisors should spend their full time working with the teachers to develop an educational program in line with the needs indicated.

25. That the units of classes for orthopedically handicapped children be integrated with the schools in which they are located and that the children in them be given the benefits of the general educational facilities and activities to the greatest degree possible.

26. That there be provided an adequate budget for special supplies required by these classes.

27. That facilities for Special Correction be provided orthopedically handicapped children who have serious speech handicaps.

28. That the objectives of the reconstruction program and of the classroom teacher be understood mutually by both physicians and teachers.

29. That the present contract plans of individualized instruction be supplemented by group activities and the present limited curricular offering be extended to include the arts, crafts, home making and shop work on the basis of the individual child's ability to participate in and profit from them.

30. That in-service training be provided which will give the teachers a better understanding of orthopedically handicapped children, the community resources serving them and the ways in which teachers can be most effective in meeting their varying needs.

31. That the vocational capabilities of each child be evaluated, his vocational interests ascertained and that his high school courses be adapted to meet his needs where practicable.

32. That facilities for carrying out physical therapy be provided by the Department of Hospitals, Board of Health or Board of Education in each school containing classes for crippled children.

33. That treatment be given by technicians graduated from schools approved by the Council of Physical Therapy of the American Medical Association.

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34. *That the equipment for physical therapy be simple and inexpensive, consisting of a table, a few rugs and mats, and apparatus for radiant heat and ultra-violet light.*

35. *That in no case should such treatments be given when a child is receiving private treatment unless the physician in charge requests it in writing. To avoid any tendency for the child or his parents to regard such treatments as a substitute for supervision by his physician, it should be insisted upon, and provision should be made, for the child to visit his physician at regular stated intervals when the prescription for the physiotherapy should be renewed. The physician requesting continuation of physical therapy treatments should be required to make reports of progress and length of time treatment is to continue until the next examination by him.*

36. *That therapeutic pools for the treatment of crippled children be limited to hospitals.*

37. *That swimming instruction be given to an orthopedically handicapped child only upon a written prescription of the physician attending the child.*

38. *That orthopedically handicapped children in need of physical therapy who are not receiving it elsewhere, but who are not sufficiently handicapped to justify their admission to special classes, be assigned to regular classes in schools in which physical therapy facilities are available and given appropriate treatment as prescribed by their physicians.*

39. *That the services of sufficient specially trained physical education teachers be available for each unit of classes for orthopedically handicapped children and that they be responsible for executing programs of physical activities based upon the recommendations of the physician.*

40. *That the necessary space and equipment for a physical education program which is supplementary to and a continuation of the therapeutic care be provided.*

41. *That the number of orthopedically handicapped children of pre-school ages be determined by more thorough investigation both by the Department of Health and other resources and that adequate treatment be instituted early in this group so that the eventual special class load will be diminished.*

RECOMMENDATIONS

Children with Cerebral Palsy

1. *That children with cerebral palsy be classified by physicians specially qualified in this field.*

2. *That children be referred for continued direction of treatment at appropriate clinics, and that they be reclassified at least once every year.*

3. *That each such child shall receive a mental and physical examination.*

4. *That specific directions for treatment be revised as the child progresses. These directions for treatment should constitute the prescriptions for all specific therapy provided these children by the physiotherapists in the schools.*

5. *That children with cerebral palsy in need of physiotherapy be assigned to schools in which physiotherapy facilities are provided.*

6. *That children with multiple defects, such as severe speech defects, severely impaired hearing, seriously defective vision, and low intellectual capacity be handled on the basis of their individual needs and the existing resources of the educational system to meet the needs, i.e., in the School for the Deaf, sight-conservation classes, etc.*

7. *That children who are so physically incapacitated that they cannot attend to their personal needs be not included in the educational program of orthopedic classes or regular classes.*

8. *That instruction of children with cerebral palsy be directed towards strengthening those abilities which are least likely to remain permanently impaired and that treatment programs be provided teachers so that they may direct the instruction into the most promising channels.*

APPENDIX

Procedure for Screening Examination of Orthopedic Disabilities

The purpose of this type of examination is not to diagnose conditions but to recognize deviations from the normal. It presupposes that those doing the examination have been trained in recognizing the deviations from the normal should they exist.

It is not possible to give a detailed method for conducting the screening examination, as every school presents a somewhat different problem. It is essential that all the details be carefully considered before beginning the examination.

PREPARATION OF THE PUPIL

The chief difficulty in giving examinations is the necessity for removing the greater part of the clothing, as the examination cannot be done without exposing the body. In the majority of junior and senior high schools, where children wear gymnasium suits while participating in their physical education activities, it is comparatively easy to conduct this screening examination. Elementary school children do not usually change their clothing for physical activities and some difficulties may arise in having them undress for the examination.

The usual procedure is to have the boys remove their shoes and stockings, roll up their trousers and remove all the clothing to the waist. The girls are asked to remove their shoes, stockings, and clothing to the waist, and a sheet is fastened over the chest.

The examiner should have mimeographed or printed blanks containing the part of the body to be examined and the things to be observed in that area.

The examination can be done more quickly if someone is present to record the findings. (The examiner can indicate the findings as they are observed and concentrate on the examination and not have to stop and record the findings.)

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I. PROCEDURE FOR AN ORTHOPEDIC EXAMINATION

The examiner should sit with his back to a good source of light as the subject walks toward the examiner.

Note any alterations, in gait, such as limping, dragging of foot, spastic or waddling gait, walking on toes or heels, inversion or eversion of the foot.

Causes. The most common causes of an abnormal gait are diseases of the nervous system, muscles and bones. Certain nervous system diseases prevent the proper functioning of the muscles, e.g., infantile paralysis; while the bone conditions produce shortening or reduce movements in the articulating surfaces (joints) e.g., tuberculosis of the hip.

The spastic gait results from overstimulation of the motor nerves, and produces overcontraction of the muscles. When this condition involves the thigh muscles, the leg swings forward in a narrow arc with the feet turned inward and the toes dragging along the ground. If this condition is bilateral the legs tend to cross each other, producing the "scissor gait." The *waddling gait*, or duck walk, is seen in congenital dislocation of the hips and muscular dystrophy, etc.

A *staggering gait* is best exemplified in alcoholic intoxication.

Diseases of the cerebellum and semicircular canals produce this type of gait.

Infantile paralysis which involves muscles of the lower extremities or trunk may cause abnormal ways of walking, e.g., flat feet, corns, blisters, and muscle and joint injuries.

Diseases involving the hip joint, e.g., Perthe's disease and tuberculosis, usually cause a change in the normal method of walking.

II. FEET AND TOES

FEET: Position: *Normal Dorsal flexed Planter flexed Pronated Supinated*

Longitudinal Arch: *Normal Low High*

Transverse Arch: *Normal Low High*

TOES: *Normal Hammer Overriding Callus Deformities*

In order that the feet may be better examined it is advisable to have the subject stand on a pedestal. This pedestal may be a box or chair, but a mirror as described by Sir Robert Jones* can be used as a pedestal and also as an objective method for detecting weak feet.

FEET: Position: Muscular unbalance, most commonly caused by infantile paralysis club feet, diseases of the bone, operations, and bad walking habits cause changes in the position of the feet.

Foot deformities are grouped under the term "talipes" and the following terms are used with talipes to show the change of position.

Equinus—Walking on the toes, feet are plantar flexed.

Calcaneous—Walking on the heels, feet are dorsal flexed.

Valgus—Walking on the inner borders of the feet, foot is pronated.

Varus—Walking on the outer borders of the feet, foot is supinated.

There may be combinations of these deformities, such as, equinovarus (valgus), calcaneovarus (valgus), etc.

Longitudinal Arch—The mirror test seems to be the best method for judging a high or low arch.

Mirror Test. The pupil stands on the plate glass, under which, and facing the light, is a mirror set at an angle of 45 degrees to the floor. In the normal feet, the weight-bearing surface is seen as a white area along the outer border of the feet. When the inner border of the foot is white, it usually indicates a low arch, or pronated foot. If the sole and heel of the foot is white and the center of the foot shows pink, indicating it is not touching the glass, the subject has a high arch.

If the mirror test is not used the following tests are suggested.

a) If a plumb line is dropped from the middle of the patella (knee cap) it would pass through the middle of the ankle joint and between the first and second toes.

b) Look at the Achilles tendon. If the body weight is distributed

* *Orthopedic Surgery*, Jones, R., and Lovett, R. W., Second Edition Revised, William Wood & Company, New York, 1929, p. 638.

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properly the Achilles tendon, or heel cord, will be straight. When there is a bowing inward of the heel cord, it indicates a strain on the muscles and ligaments of the arch and is found in those having pronated feet and weak arches.

Metatarsal Region—In abnormal conditions the following signs may usually be observed:

1. A depression behind the toes on the dorsum of the feet.
The extensor tendons of the toes are shortened and can be plainly seen.
2. The toes are flexed and the ends are flattened, producing what is known as hammer toes.
3. Callouses are found on the plantar surface of the feet.

In order to protect the heads of the fallen metatarsal bones, the skin under the heads of the bones becomes thicker.

TOES: Examine the toes and note if the big toes point outward (hallux valgus), if a bunion is present at the base of the big toe, or hammer toes, corns or callous formations are present.

III. LEGS—*Normal Bow Knock-kneed Hyperextended Flexed*

Examine the legs as the subject stands with his feet together. Bow legs and knock knees are usually associated with rickets in childhood. Many pupils have these conditions and only those showing wide deviation from the normal should be selected for the orthopedic physician's examination. These conditions have a great influence on weight distribution in the feet.

The hyperextended knees are seen in those with flexible joints and are sometimes found in those with weakness in the hamstring muscles.

The flexed knee is usually due to muscle weakness or disease of the hip joint.

IV. POSTURE—*Good Fair Poor*

The purpose of the posture examination is to determine the mechanical efficiency of the body.

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The subject stands in an easy unstrained position and gazes at some object straight ahead. The posture may be judged on the following:

<i>Good Posture</i>	<i>Fair Posture</i>	<i>Poor Posture</i>
1. Straight or slight forward inclination of the head.	Moderate inclination of the head.	Exaggerated inclination of the head.
2. The shoulder position is slightly anterior to the line of gravity.	Shoulder position usually more anterior to line of gravity.	The shoulders sag forward.
3. The chest is moderately elevated.	The chest is slightly depressed.	The chest is markedly depressed.
4. The abdomen is flat from the pubis to the sternum.	There is a slight protrusion of the abdomen.	Abdomen is definitely prominent.
5. There are the normal anterior-posterior curvatures of the spine.	The anterior-posterior curves of the spine are exaggerated.	Kyphosis and lordosis are observed.

The position of the head and neck, shoulders, chest, anterior-posterior deviations of the spine and abdomen, are used as the basis for grading. It is important to remember that these standards are for the adult. During the first years of life, the child is adapting himself to the change from the horizontal to the vertical position. The normal posture of young children includes a prominent abdomen and lumbar lordosis with a very straight upper back. The posture of the pre-adolescent represents a gradual change produced by growth under the influence of gravity and much modified by environment.

V. SPINE—*Normal Lateral deviations*

Lateral deviations of the spinal column, called scoliosis, may be noted by inspection and palpation of the spinous processes of the vertebrae. By marking the spinous processes with skin pencil or lipstick; then stretching a string from the prominent vertebrae on

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the neck to the end of the spinal column, the marks will fall along the string line in a normal spine. Deviations to the right or left indicates a lateral curvature.

A *postural* or *functional* scoliosis will straighten out when the subject bends forward. In a *structural* scoliosis there is a bulging upward on the same side of curve and in the same region.

VI. SCAPULA—*Normal High Low Rotated Winged*

Note if the scapulae are level; if one is higher than the other, or there is rotation outward or inward. These conditions as well as the winged scapulae are usually due to muscular weakness. There is a condition known as Sprengel's deformity which is a congenital elevation of one scapula.

VII. SHOULDERS—*Level High Low Forward Back*

Few persons have perfect alignment of shoulders and only those cases which show a marked deviation from the normal should be selected. Abnormal position of the shoulders is usually associated with poor posture and kyphosis.

VIII. CHEST—*Normal Elevated Depressed Deformity*

Inspect the chest for abnormal elevation, depression or deformity. Often a deep funnel-like depression may be seen at the end of the sternum, or a forward bulging of the sternum which protrudes like the prow of a boat, with the ribs sloping away to the sides. The funnel and the chicken breast, as they are called, are most often due to rickets.

IX. ARMS AND HANDS—*Normal Deformities*

Have the subject hold out both hands and inspect them carefully. The inability to hold out the hands with atrophy of the muscles in the arms and shoulders, is usually due to infantile paralysis. Loss of an arm or hand may be a congenital condition or the result of an accident. Deformities of the fingers, supernumerary or webbed fingers may be seen.

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Obstetrical, or Erb's paralysis, produces a deformed arm and can usually be diagnosed by asking the subject to bring the palm of the hand to the mouth. The subject will "kiss the back of the hand" instead of bringing the palm of the hand to the mouth.

X. HEAD AND NECK—*Normal Large Rotated*

The shape of the head is often diagnostic of existing pathology. The extremely large head is often seen in hydrocephalus. When the chin is tilted to the side the position of "listening to the shoulder," it usually is a condition known as torticollis, or wry neck.

The orthopedic physical examination will screen out the following groups of children:

- Group I. Children requiring primarily the care of an orthopedic surgeon.
- Group II. Children requiring occasional check-up by an orthopedic surgeon and regular physical therapy treatments.
- Group III. Children with functional conditions predisposing them to orthopedic defects.
- Group IV. Children with permanent disabilities who have already received maximum benefits from orthopedic surgery, therapy, and the like.

Group I and II

In this group will be found conditions such as Poliomyelitis, cerebral birth injuries, structural scoliosis and kyphosis, torticollis, Erb's palsy, congenital hip dislocation, coxa vara and cosa valga, club foot, fallen arches, tuberculosis of bones, osteomyelitis, Perthe's disease, fractures, sprains, dislocations, and certain congenital malformations.

If the child is already under the care of an orthopedic surgeon, the duty of the physical therapy department will be (1) to find out if surgery, braces, physical therapy or other treatment has been

APPENDIX

prescribed, and whether or not the recommendation of the orthopedic surgeon has been carried out; (2) to secure the cooperation of the child and follow up the recommendations. If, on the other hand, the child has not been under the care of an orthopedic surgeon before, the family will be approached and necessary information as to location of clinics, etc., is given. Should the child be under the care of a private physician who does not specialize in orthopedics, the child's parents are advised to discuss the matter with this physician, securing his consent and cooperation, and thereafter reconsult with an orthopedic surgeon.

Group III

This group consists of borderline cases, that is, of children who have no orthopedic defects of demonstrable pathologies, but who display signs of poor body mechanics, including faulty weight bearing, increased A-P deviations of the spinal column, functional lateral curvatures of the spine, poor coordination, and the like. This group will need special attention in regard to nutrition, rest, and other general health problems. From the orthopedic standpoint the program is a preventive one. A close watch should be kept on these children and orthopedic examinations be repeated more frequently than for the rest of the school population. Most of these children would be taken care of by the physical education department, since they need no treatment. Selected cases in need of individual attention are referred to the physical therapy department.

Group IV

Here will be found old poliomyelitis cases, children with artificial limbs, old fractures or other injuries leaving permanent handicaps, non-treatable congenital or other deformities and post operative cases of various types where maximum recovery has been obtained. Although this group of children has to be watched from an orthopedic standpoint (for adjustment of braces, etc.) no regular orthopedic care or physical therapy is required. These children should be given modified physical education and adapted recreational activities.

APPENDIX

Relationship Between Physical Therapy and Physical Education

Orthopedically handicapped children in the schools could be taken care of either by the physical therapy department or by the physical education departments. A close cooperation between the departments must exist. The division of duties between the two departments is suggested as follows:

Physical Therapy Department

1. Takes care of treatable pathological conditions (group I and II).
2. Gives individual treatments.
3. Works under the direction of the attending physician.
4. Uses various physical therapy agents, such as heat, water, massage, Ultra-Violet light, electricity and exercise in the treatment of disease.

Physical Education Department

1. Takes care of non pathological conditions (group III) and children with permanent disabilities (gr. IV).
2. Works with groups of children.
3. Educational methods used.
4. Conducts adapted physical education and recreational activities for group III and IV, and, on special recommendation, for children in group I and II. Limited to exercise programs. No treatments given.

APPENDIX

EDUCATIONAL REQUIREMENTS FOR PHYSICAL THERAPY TECHNICIANS AND FOR PHYSICAL EDUCATION INSTRUCTORS FOR ORTHOPEDICALLY HANDICAPPED CHILDREN

Physical Therapy Technician

Graduation from an accredited school of physical education or nursing, and thereafter graduation from a course of physical therapy of at least nine months in a school approved by the Council of Medical Education and Hospitals of the A. M. A. (Applicants who do not literally fulfill these requirements but who have an equivalent training should be given individual consideration).

Physical Education Instructor

Graduation from an accredited school of physical education and fulfillment of special orthopedic requirements.

New York State Department of Education has formulated special requirements for graduates of physical education who desire to work in State subsidized schools for crippled children. It is suggested that the same requirements be adopted by the city as well.

APPENDIX

ORTHOPEDIC EXAMINATION RECORD FORM

Name School or Class Date

1. GAIT: Normal—Abnormal—Describe:
2. FEET position: *Normal Pronated Supinated Dorsal Flexed Plantar flexed*
Longitudinal Arch: *Normal Low High*
Transverse Arch: *Normal Low High-callouses*
Toes: *Normal Hyperextended Flexed—Corns*
3. LEGS: *Normal Bow Knock-kneed Hyperextended Flexed Knees*
4. POSTURE: *Normal Fair Poor—Types 1. Normal 2. Short heavy 3. Tall thin*
5. SPINE: *Straight Lateral deviation A.P. deviation Round Back*
6. SCAPULAE: *Normal High Low Rotated Winged*
7. SHOULDERS: *Level High Low Forward Back*
8. CHEST: *Normal Elevated Depressed Deformity*
9. ABDOMEN: *Normal Scaphoid protuberant*
10. ARMS AND HANDS: *Normal Abnormal (Describe)*
11. HEAD SIZE: *Normal Large Rotated*

Other findings:

..... Examiner

Medical Diagnosis

Treatment Recommended:

..... M.D.

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